TECHNOLOGY DEPT.

Gas Journal

Vol 264. 102nd Year. LONDON, DECEMBER 6, 1950. No. 4566.
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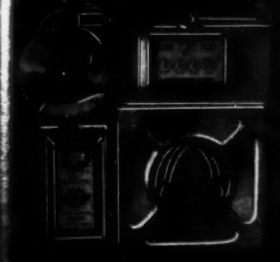

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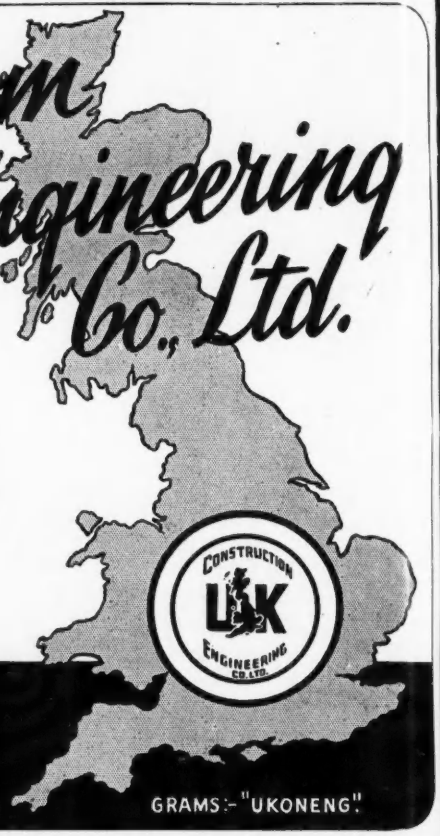

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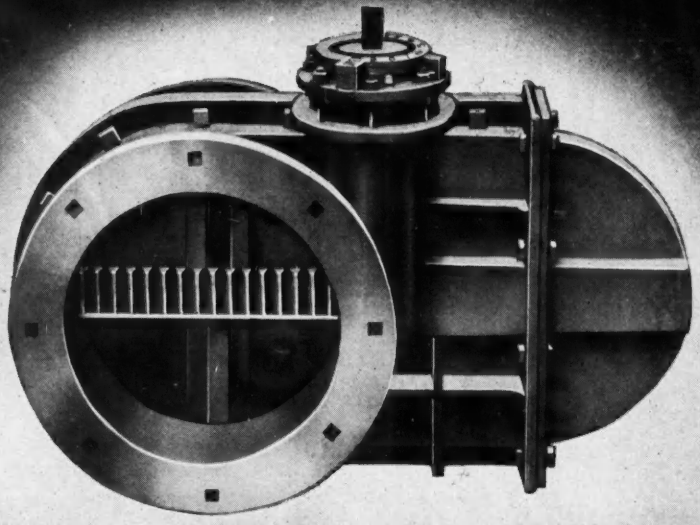

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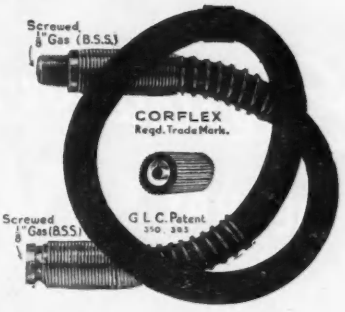

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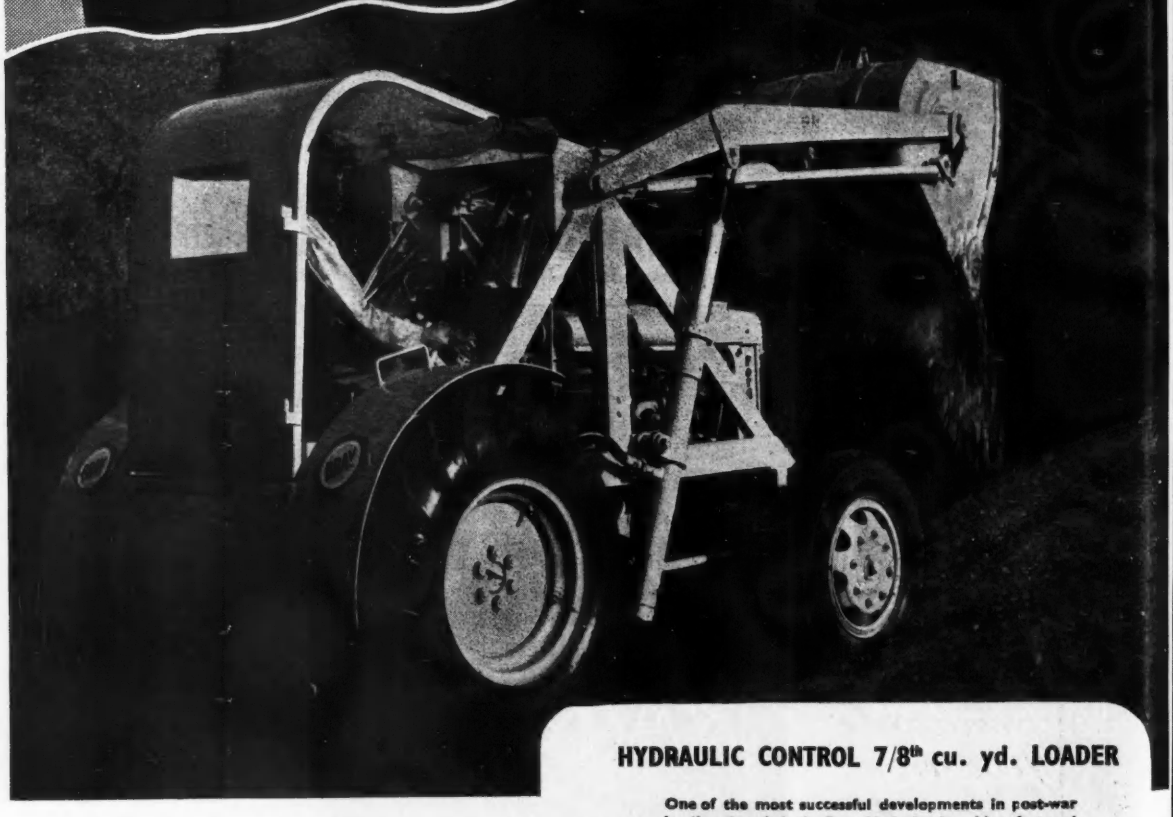

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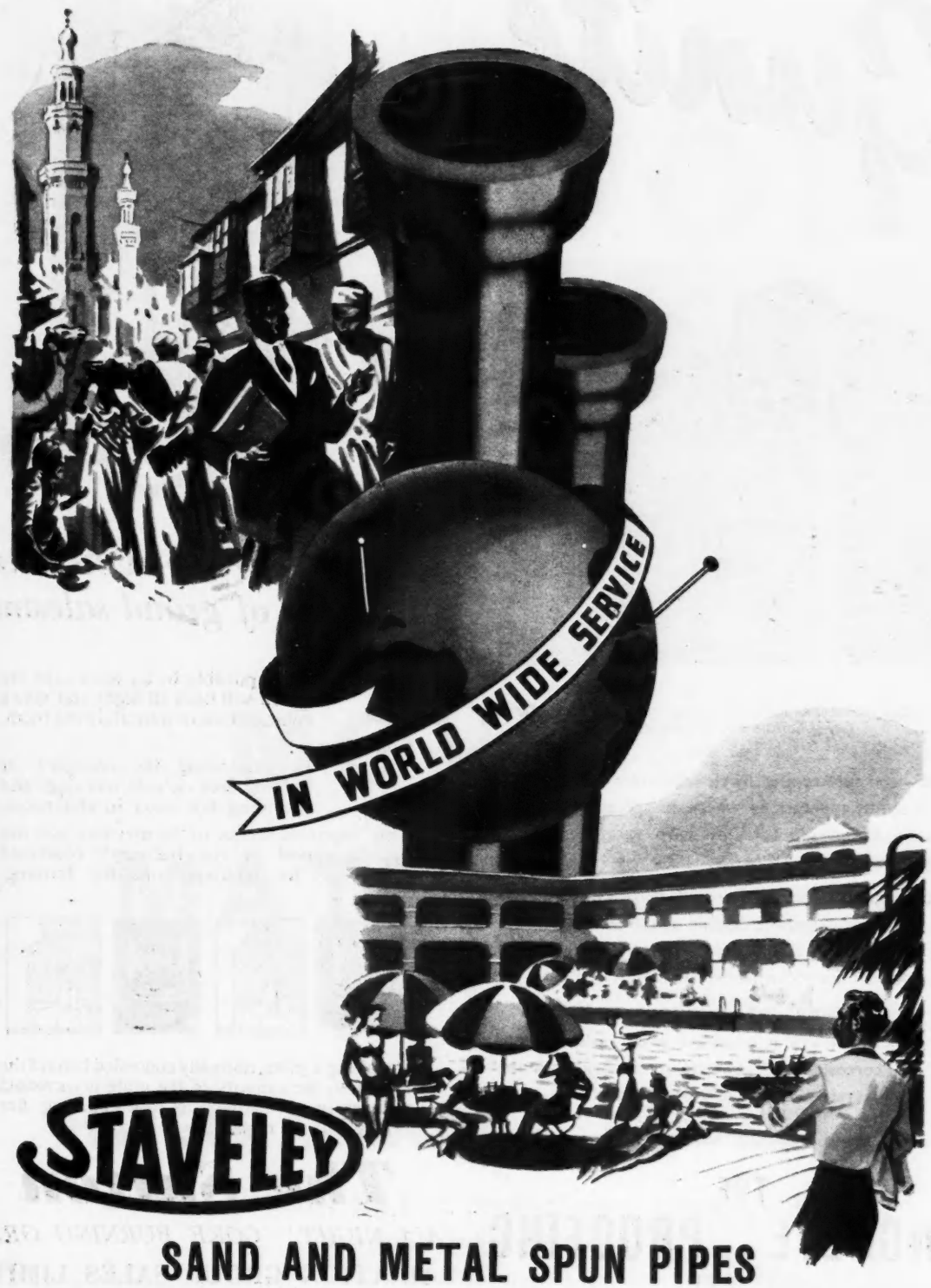

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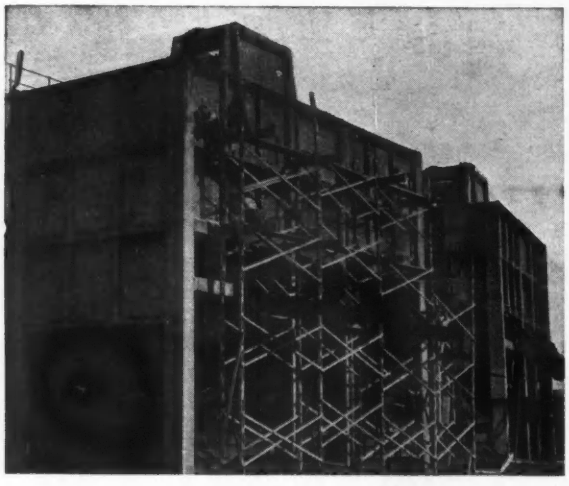

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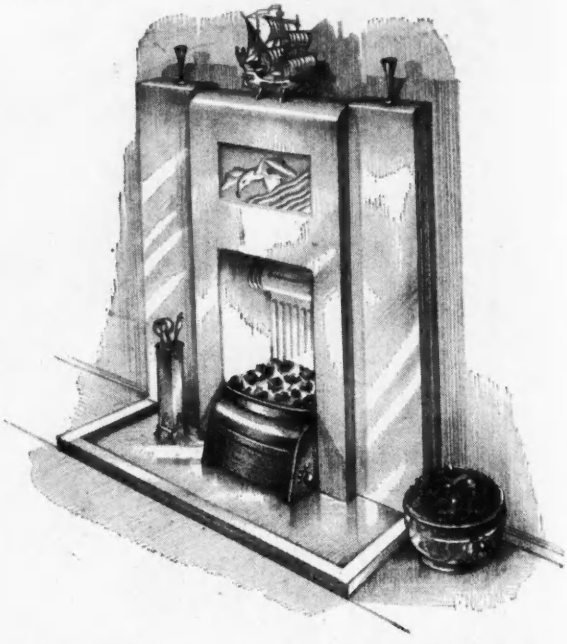

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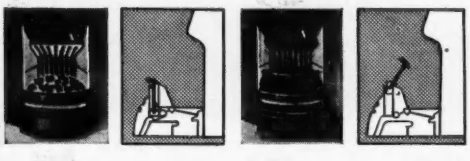

By raising a plate, normally concealed behind the fire front, the capacity of the grate is increased sufficiently to maintain a slow burning fire throughout the night.

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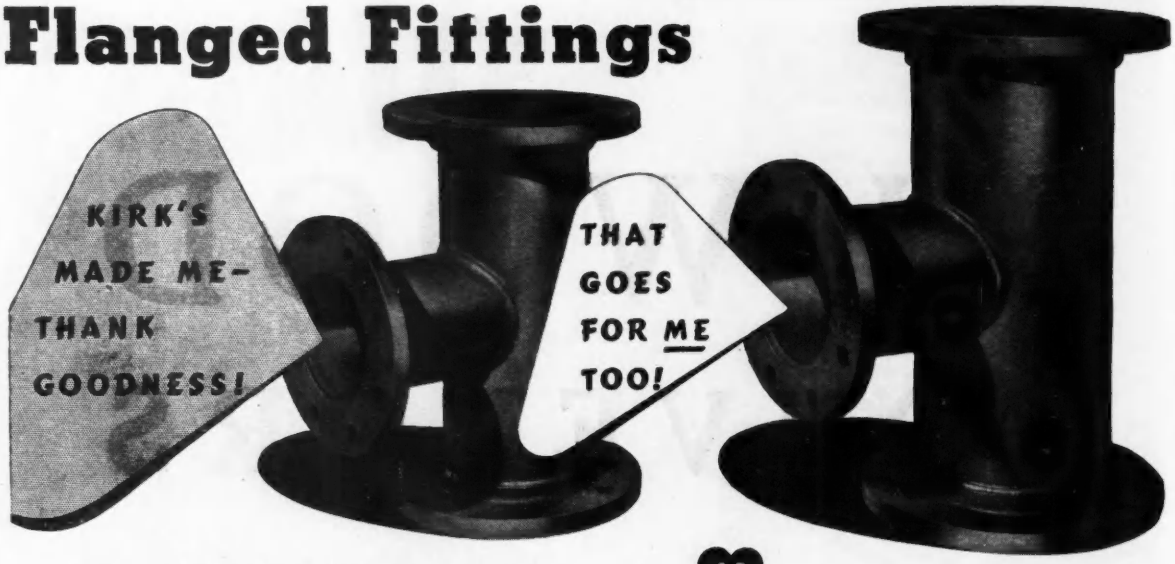

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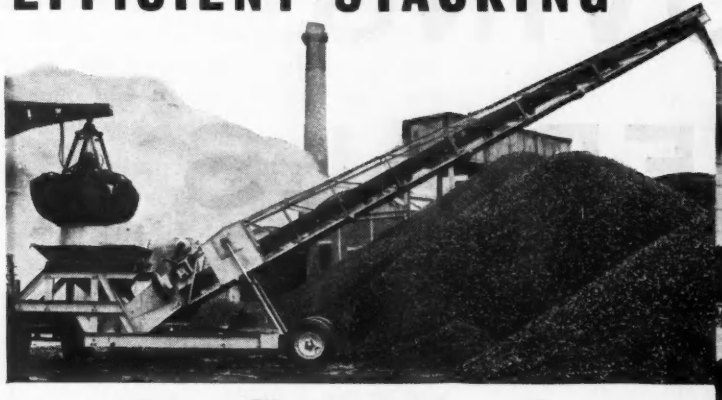

It is possible to stack coke to a height of 20 feet with a 40 foot C & T Mammoth Stacker

can virtually increase the space of storage yards

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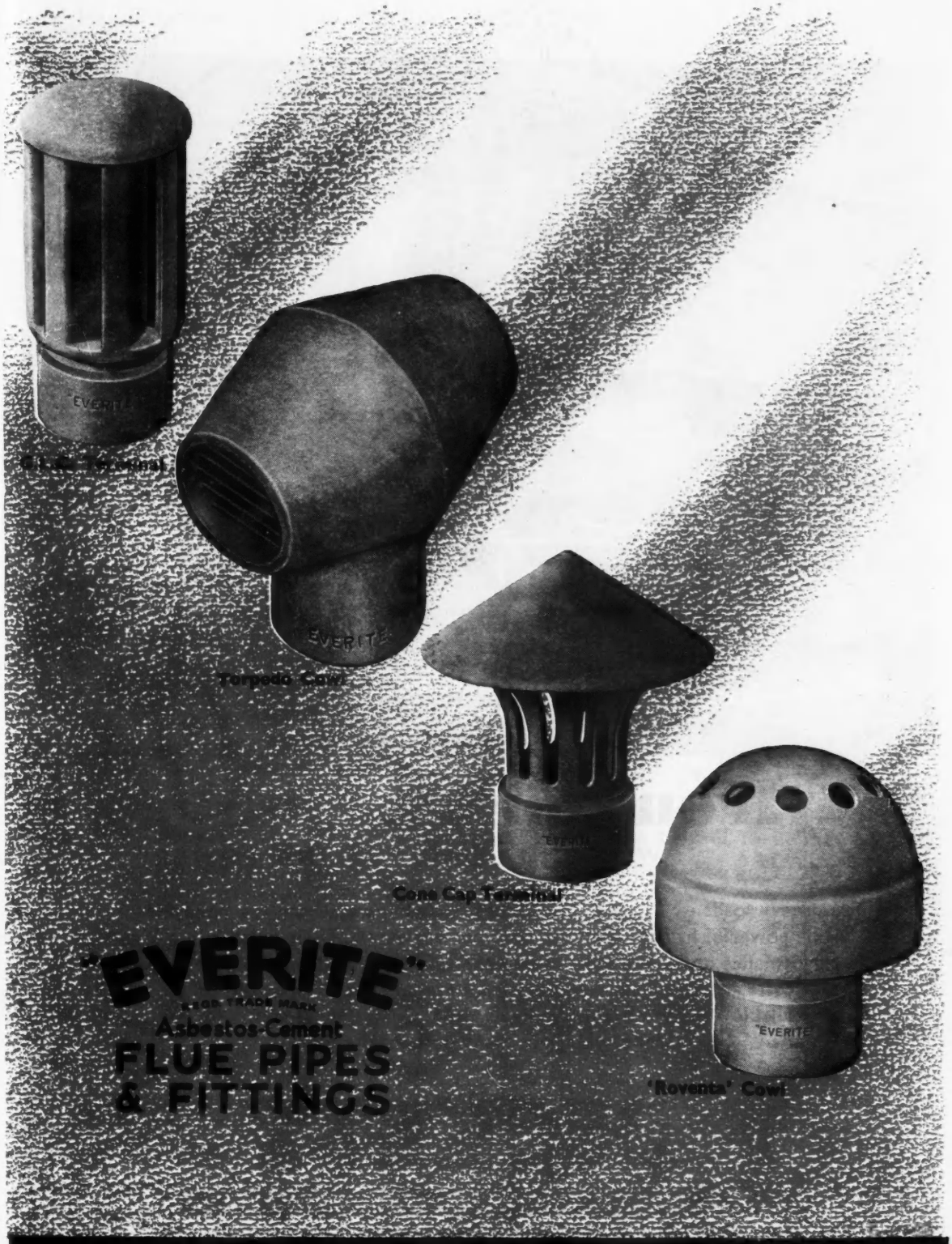

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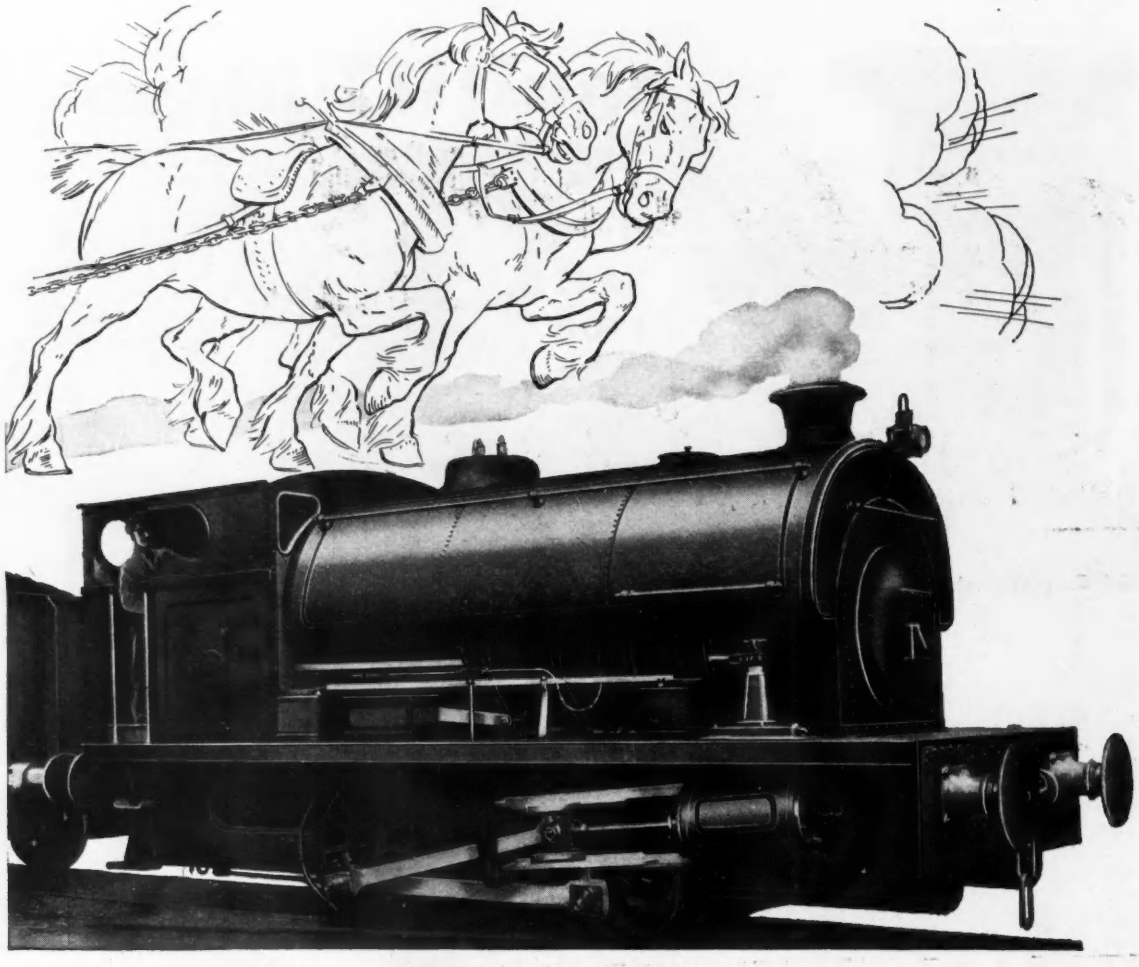

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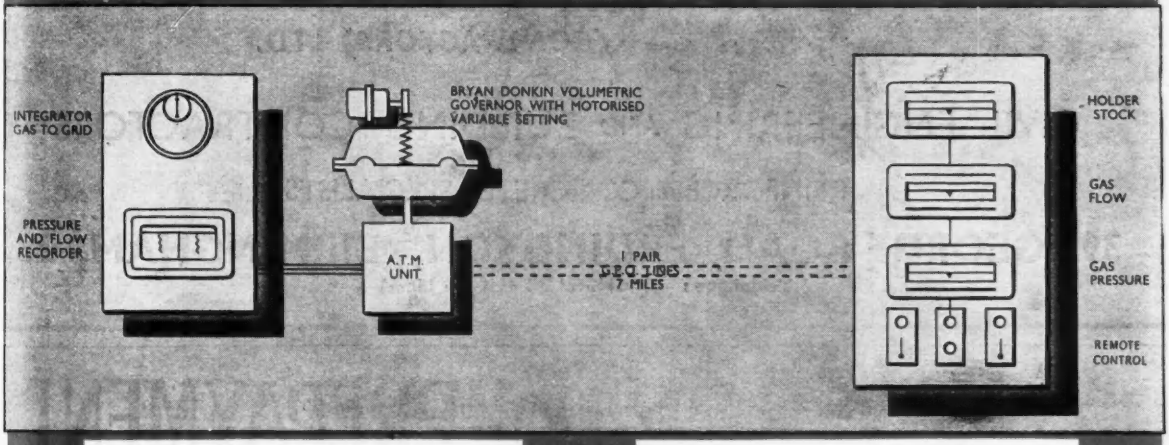

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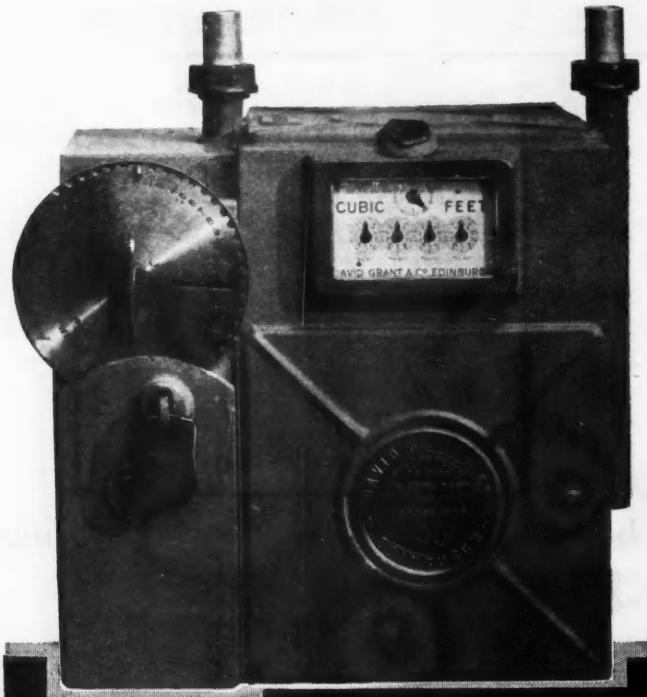

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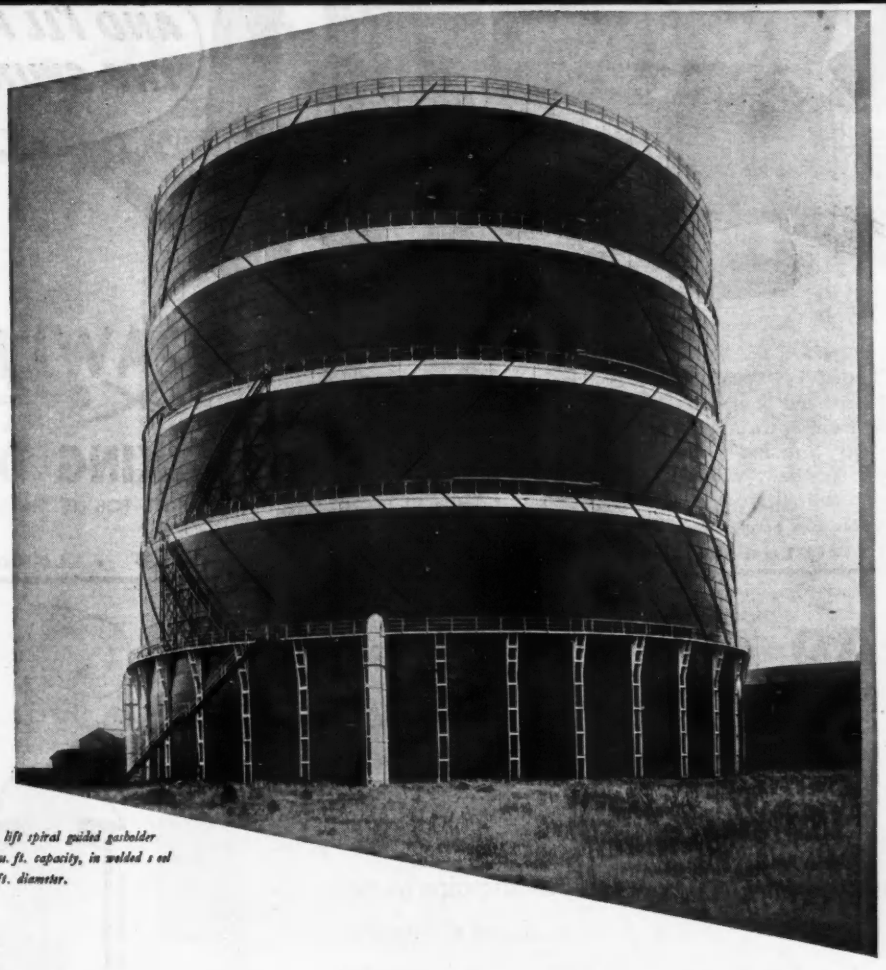

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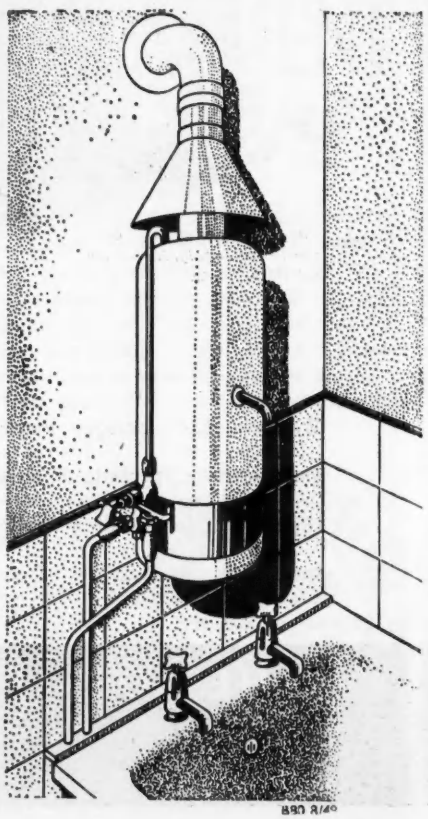

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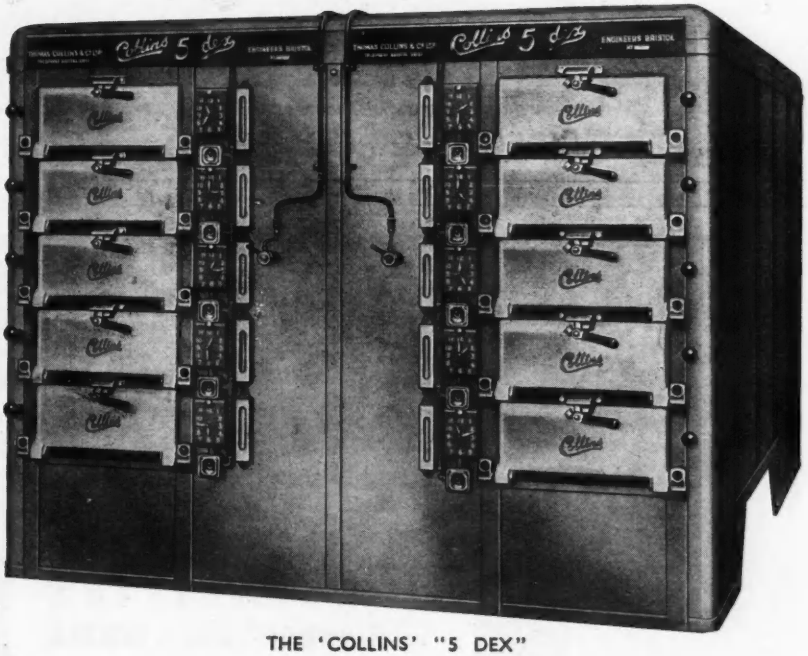

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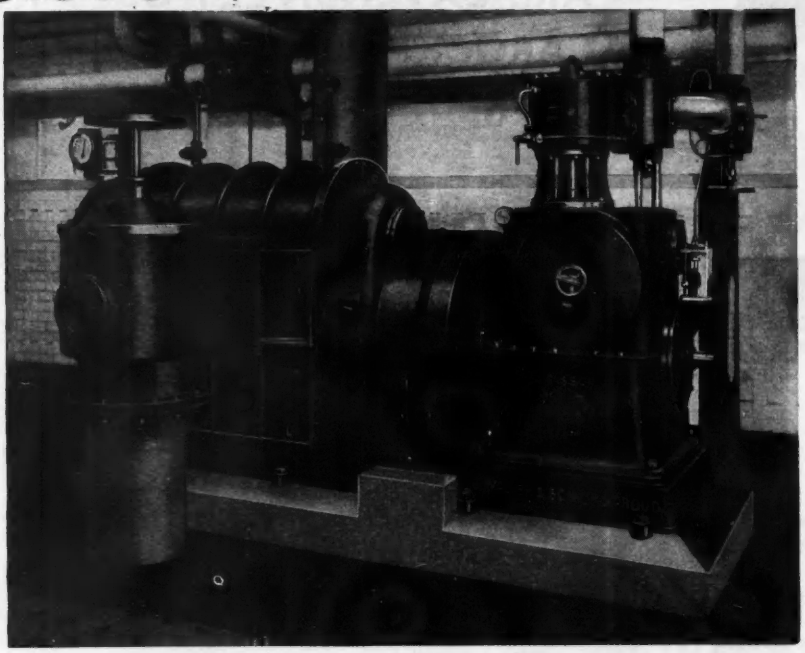

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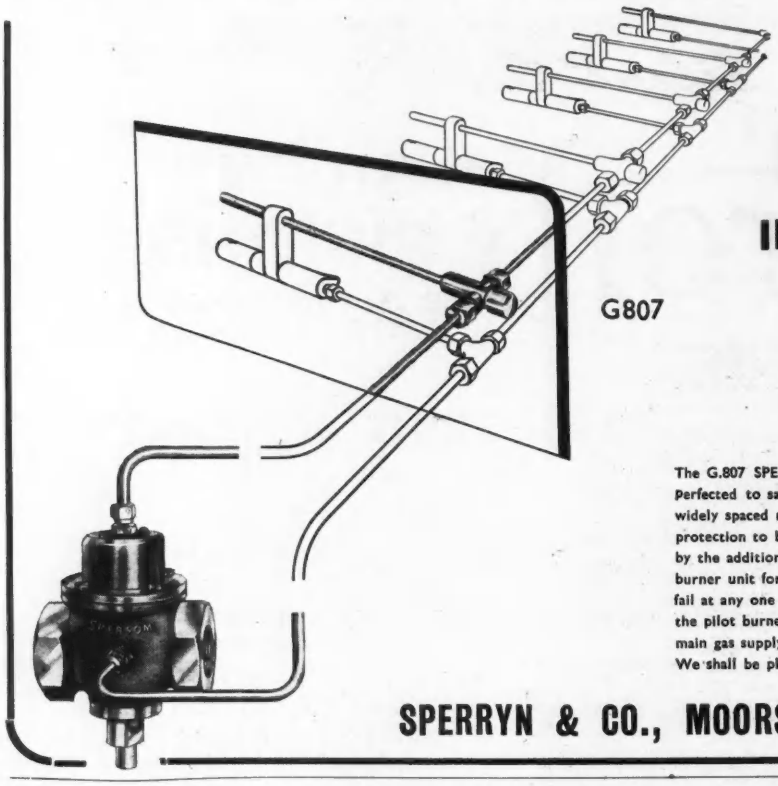

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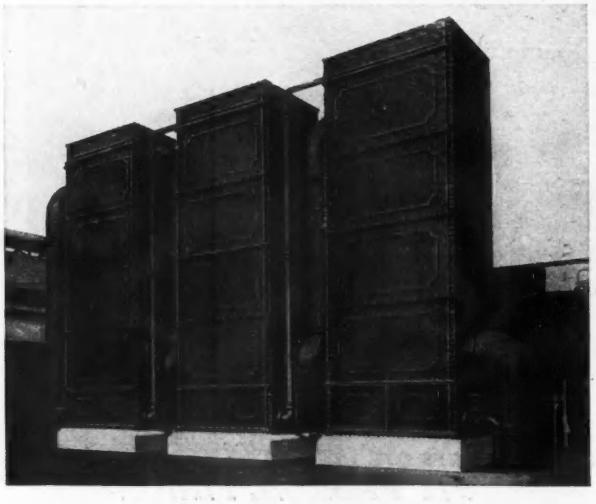

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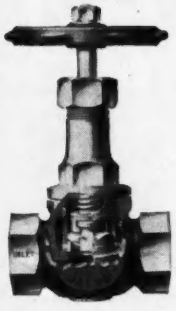
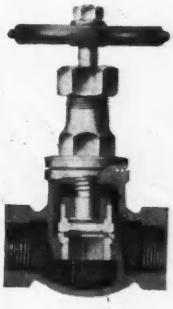

'MAC' VALVE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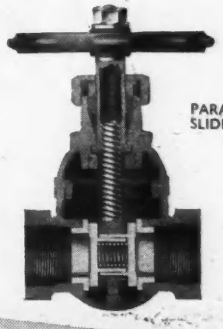
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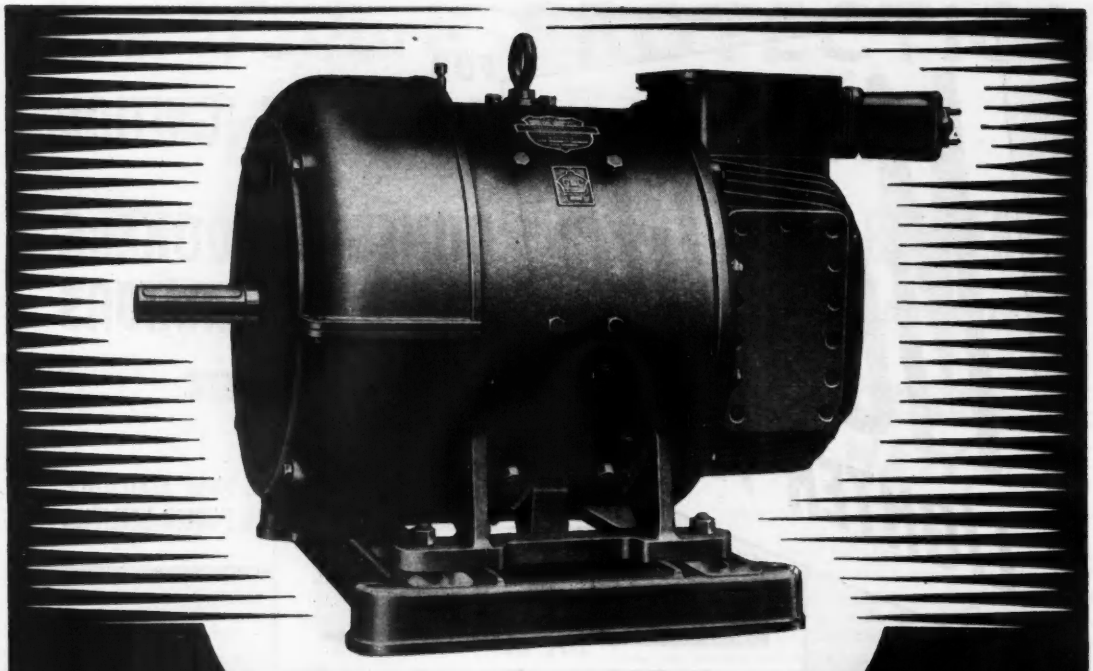

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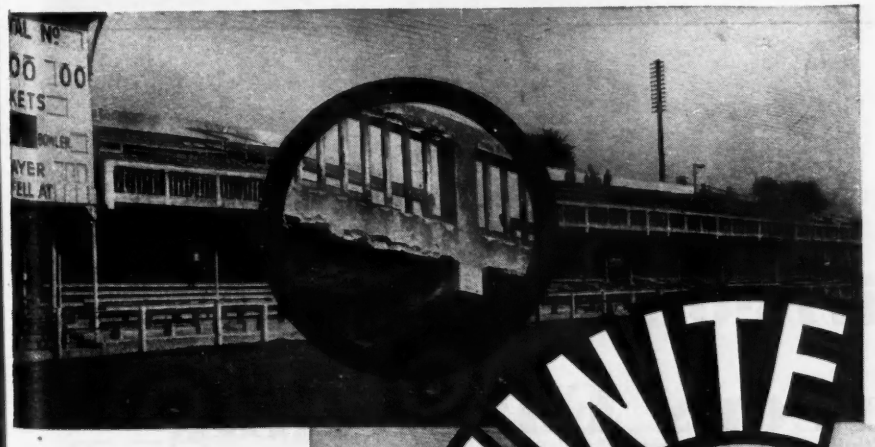

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GUNITE REPAIRS to the Grandstand at 'Trent Bridge.' Before and after treatment.

Estimates given for encasing structural steelwork and covering the wearing surface of chutes and bunkers.

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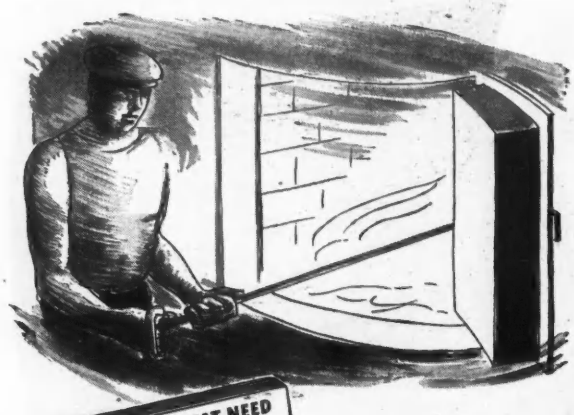

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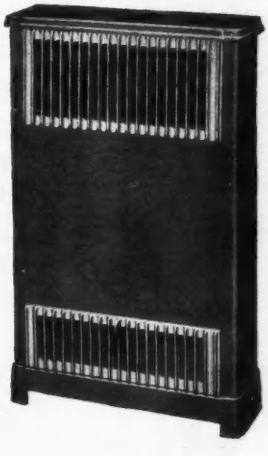

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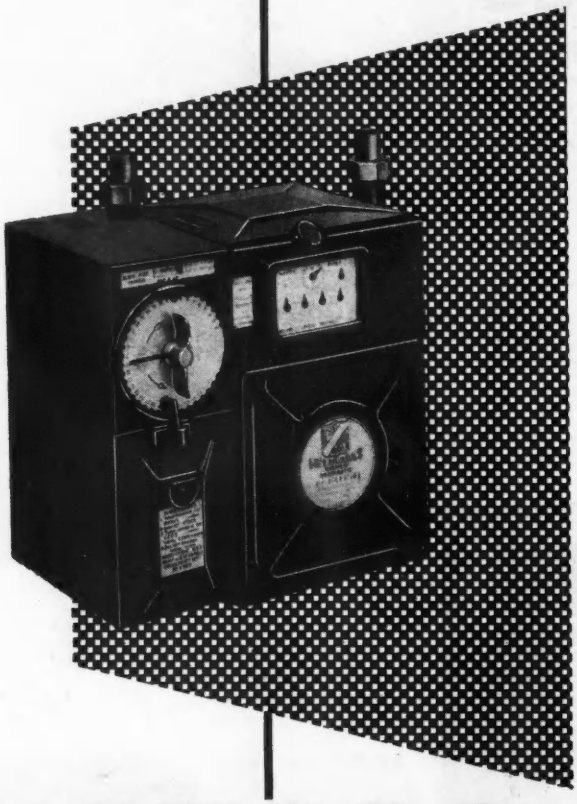

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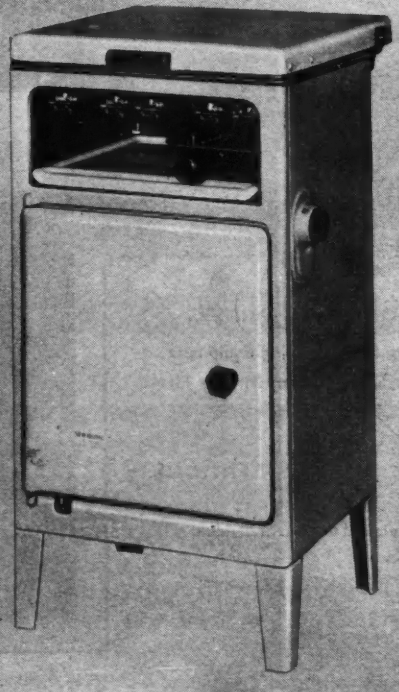

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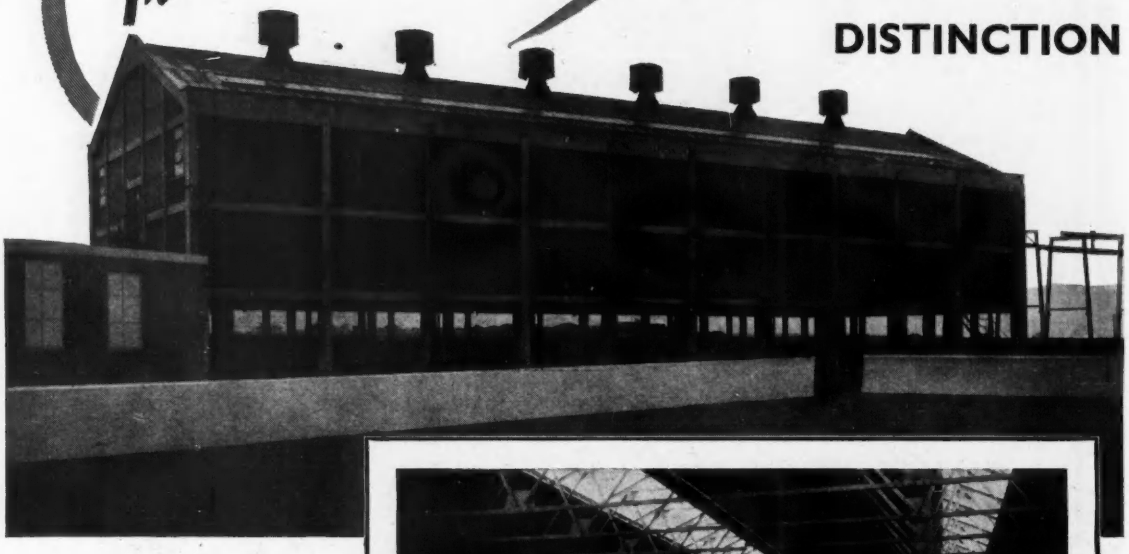

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Width over flanges	76"
Depth back-front	64"
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Flange size 10". B.S.T.	Table "A"
Capacity per Revolution.	100 c. ft.
Capacity of meter	30,000 cu. ft. per hour.

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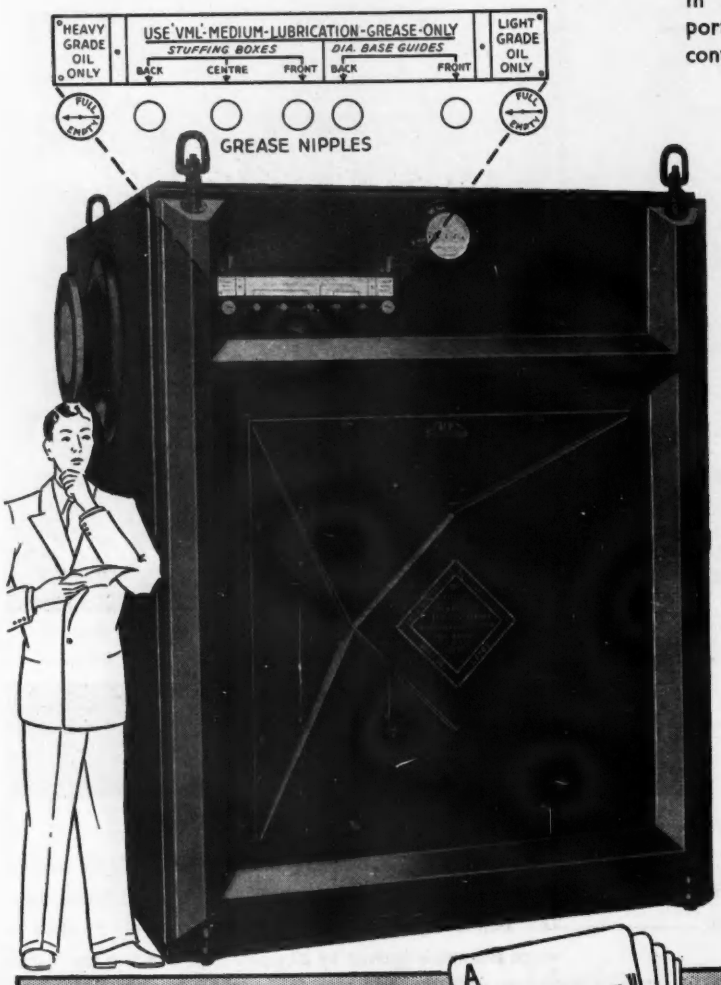

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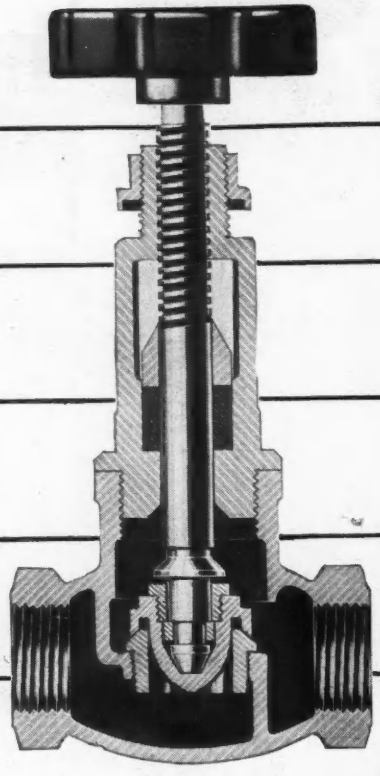

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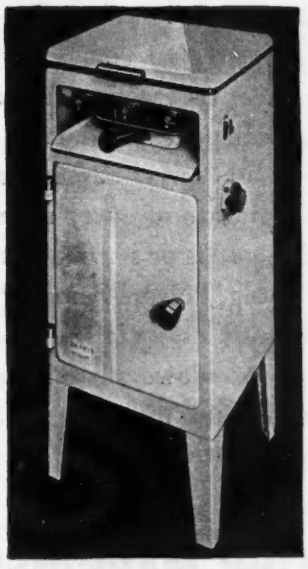

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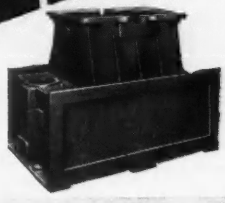

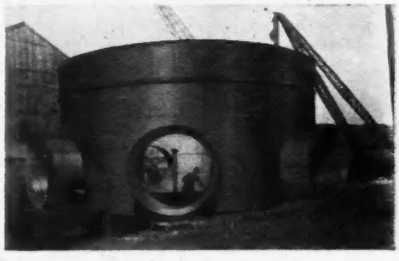

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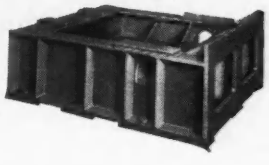

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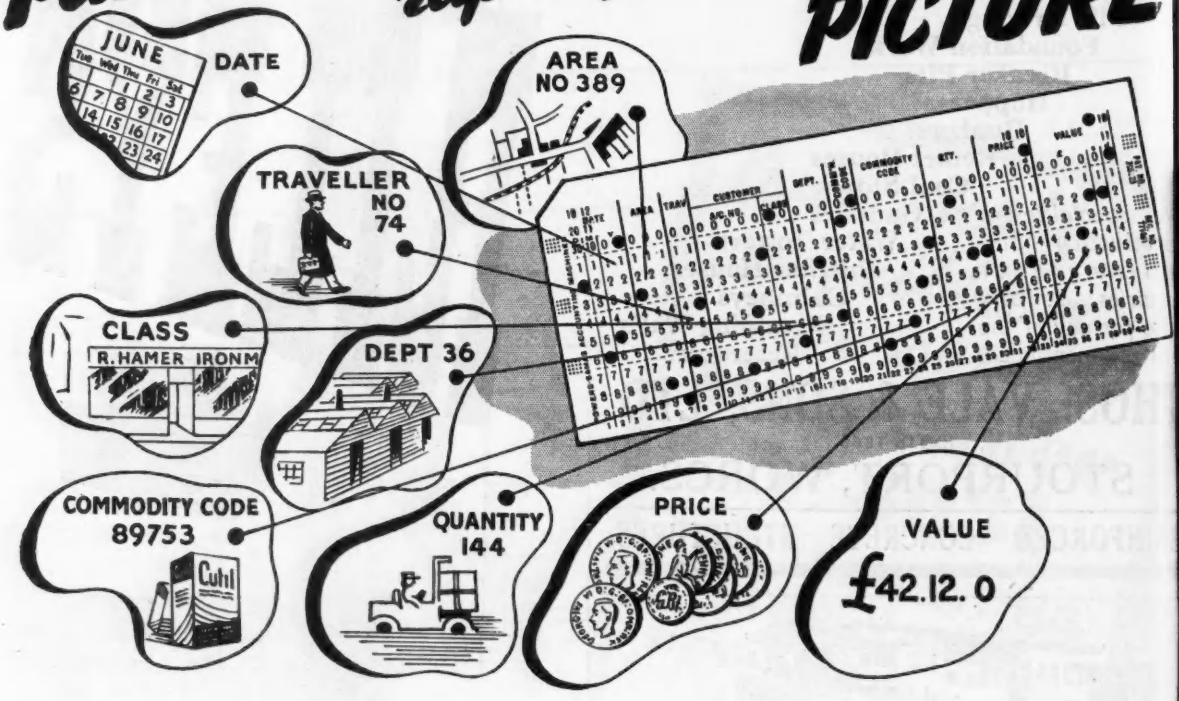

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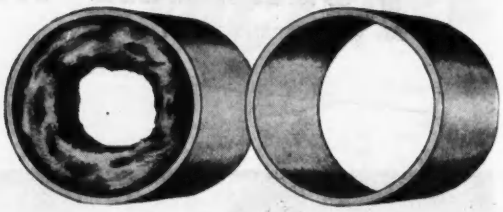

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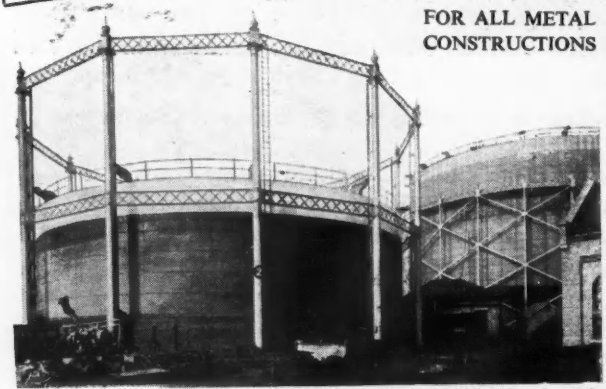

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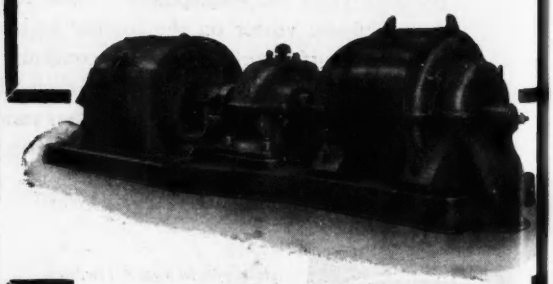

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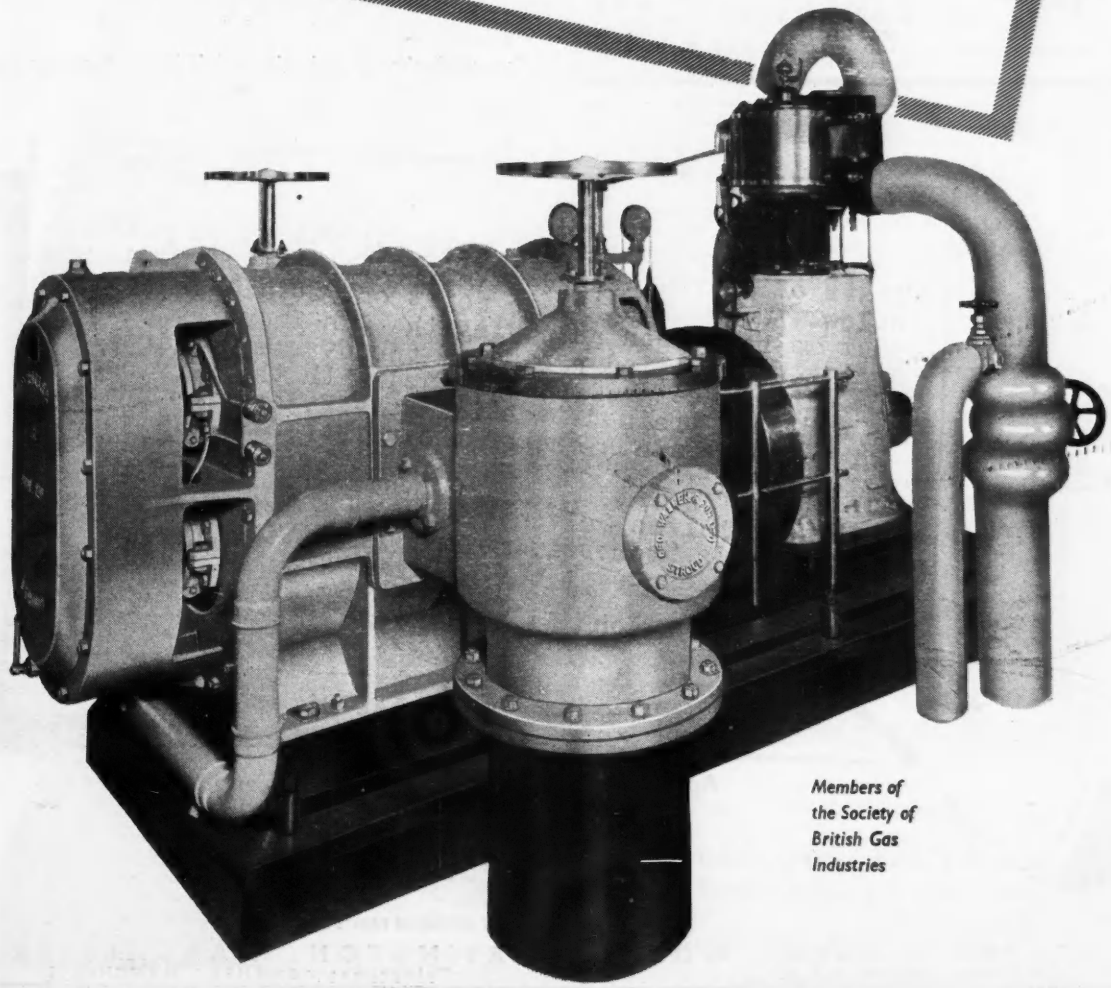

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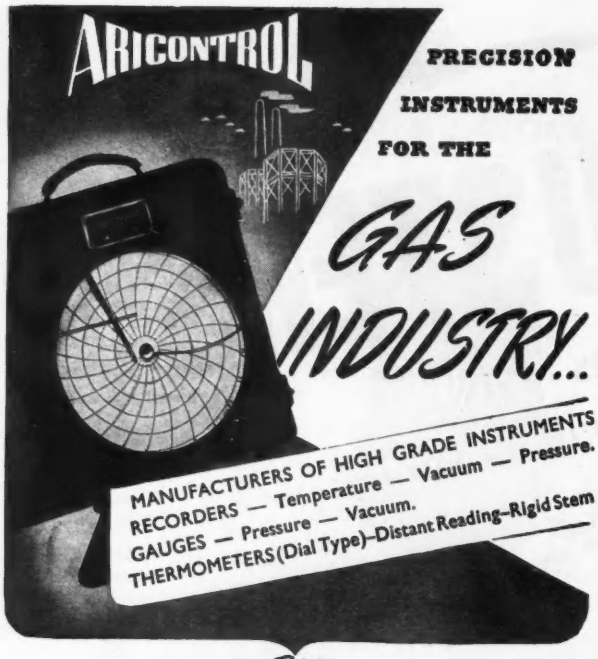

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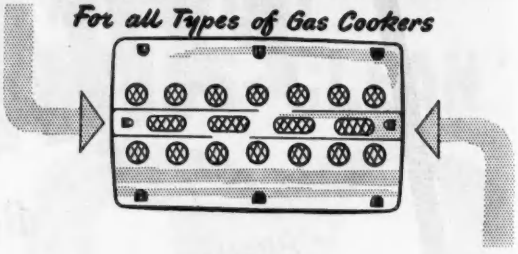

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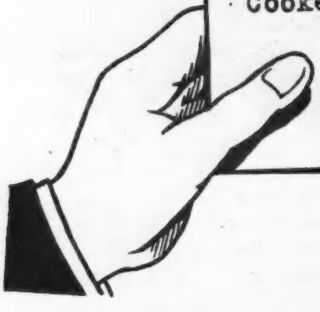

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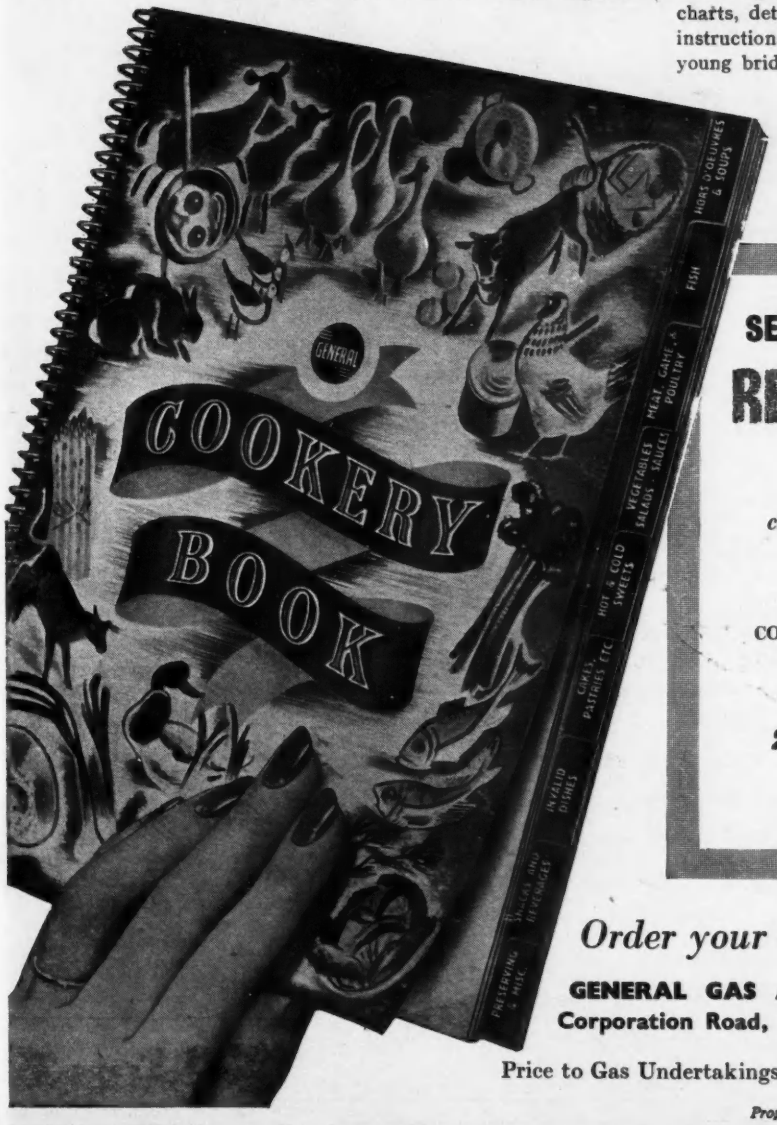

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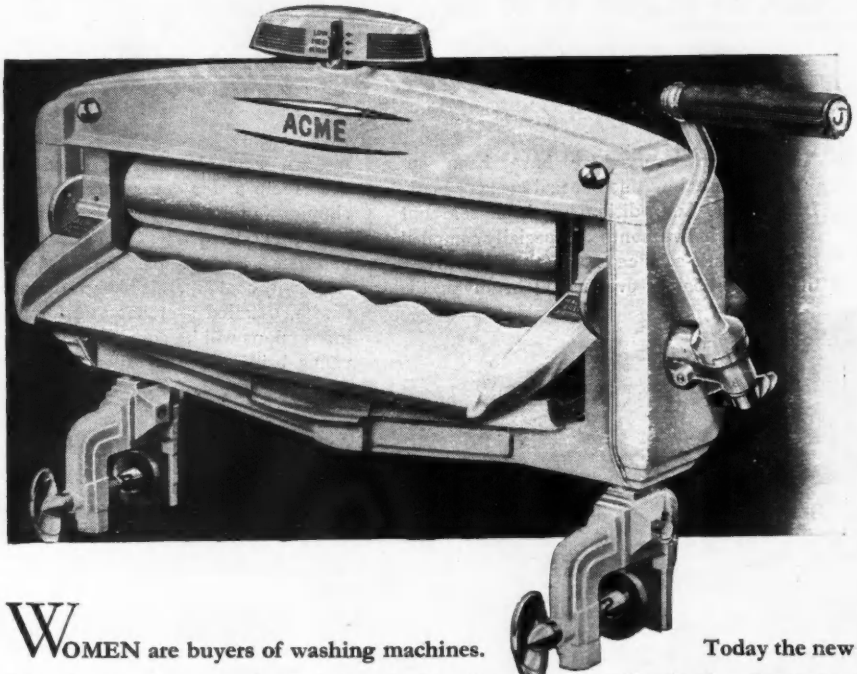

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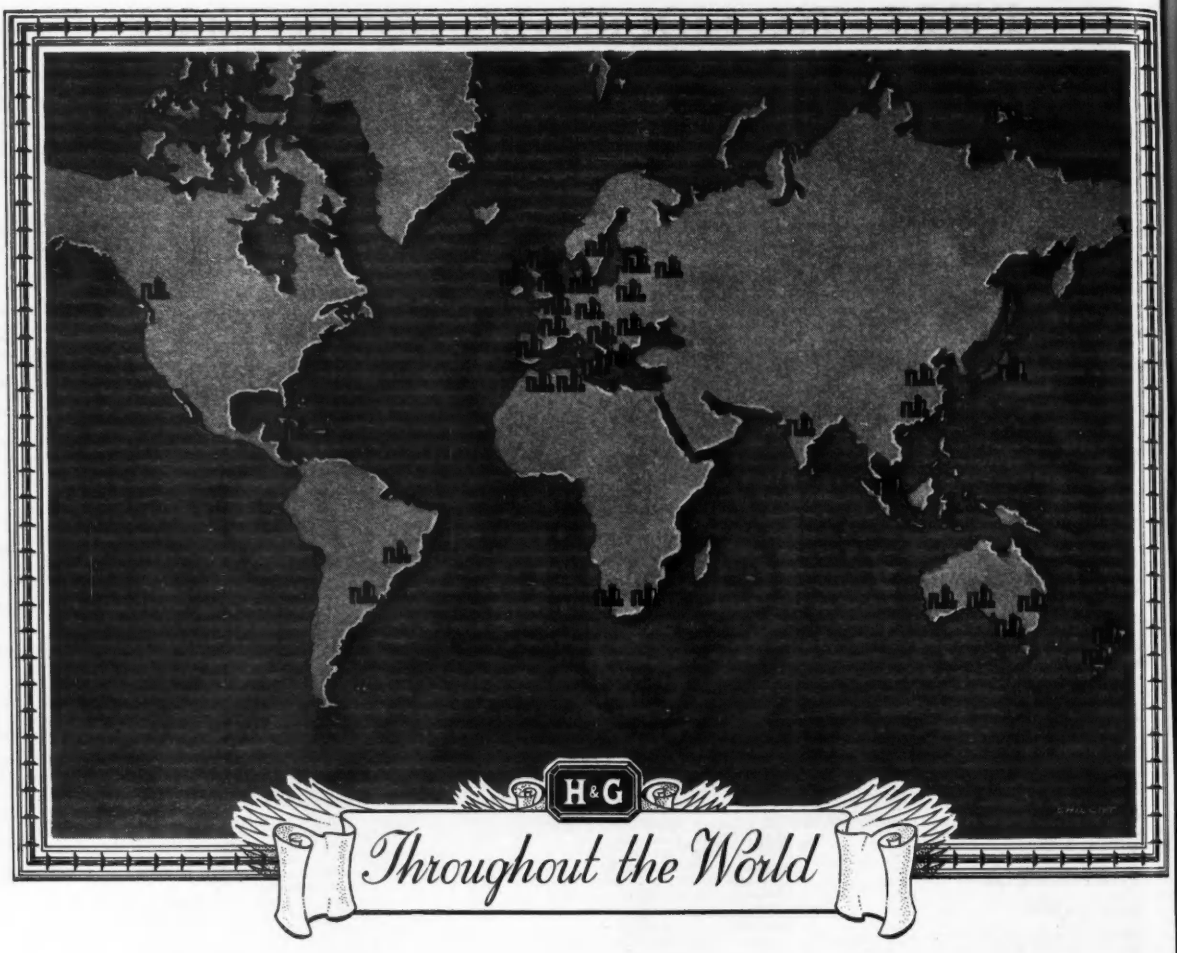

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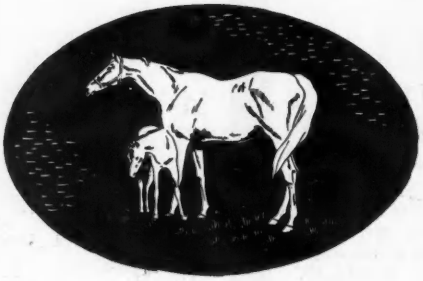

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GAS JOURNAL

VOL. 264. No. 4566 102ND YEAR DECEMBER 6, 1950

THE HIGHER THE FEWER

THE caption to this note is correct in one sense, wrong in another. It is used as introduction to a few comments on the annual research meeting last week of the Institution of Gas Engineers—the sixteenth of its kind. The caption applies in that it suggests that inevitably much of the investigational work discussed becomes more specialised—coherent to the few, perhaps, not so coherent to the many, for it is true that those who explore new avenues, blaze the trail, and so forth, have not necessarily the art of self-expression. In any case they are largely alone along their avenues, and few can offer criticism. But 'fewer' does not interpret the many who attended the research meeting last week. We do not know whether the vast attendance was due to a three-line whip from the area chiefs, or whether the fact that so many area chiefs were present in person brought respectful retinues in train—whether, indeed, the roll-call was voluntary. Only the individuals participating in the research feast can answer this query. And talking about feasts we think once again about the Research Luncheon. This supplied no light relief, and the speeches were lacking in both substance and spirit. As regards research policy we were left in the air, the sealed-lips principle being the order of the day, and presumably the order of tomorrow. All highly hoodoo. We had looked forward, for instance, to hearing something about the future of the Gas Research Board under the new nationalised research regime. On this and on other matters enlightenment has yet to come.

After these few kinds words it must not be thought that we cast aspersions on the success of the sixteenth research meeting, for it was a very successful meeting indeed. On the Tuesday afternoon, for example, box-office receipts soared, 'house full' notices were placarded, and an overflow meeting was fed by mike in the basement precincts of the Institution of Mechanical Engineers. This was tribute enough to the authors of the paper which was being presented, Mr. H. Stanier and Mr. J. B. McKean, who dealt with the production of town gas by the catalytic gasification of petroleum oils; it was also evidence of the interest which the subject has quite rightly aroused. In our columns last week we commented on the significance of the United Kingdom's oil refining programme to the fuel industries generally and to the gas industry in particular. At the research meeting Messrs. Stanier and McKean foreshadowed the possibility, in simple plant, of producing at least 1.25 therms per gallon (300 therms per ton) of 500 B.Th.U. gas having characteristics similar to those of normal town gas, using as raw material heavy petroleum fractions. It is computed that, at present prices of heavy fuel oil, it should be possible when working on full load to produce oil gas at a price competitive with that of base-load coal gas. Not only may the process considerably reduce the cost of supplying peak-load gas, but it may also provide an alternative to gas manufactured from coal, particularly where the transport of coal and coke makes these fuels costly. We appreciate that research workers are in discussion apt to be phlegmatic, but in the discussion on the paper which we are mentioning there was a serious lack of a note of urgency. Is there lack of catalytic influence at high research level?

There was, of course, no lack of earnestness during the whole of the two days' proceedings. The earnest note was struck monotonously by almost every speaker. Far be it from us to take lightly the Institution Research Meeting or to advocate the presentation of a paper by the Marx Brothers. After all, the mathematical theory of the mechanism of fluidisation, introduced by Dr. Johnson, is no laughing matter; and Dr. Garside would have gone beyond his terms of reference if he had made a joke of the basic dynamic method of attacking the problem of burning velocity. The pages of our issue of the *Journal* today do indeed demonstrate how seriously we view the gas industry's research work. Our review of the meeting which follows immediately on this note summarises the papers and reports presented, and we shall return subsequently to record much of what was said at the meeting and to comment on individual communications.

D

Gas Industry Research

THE Sixteenth Autumn Research Meeting of the Institution of Gas Engineers was held at the Institution of Mechanical Engineers, London, on November 28 and 29 under the presidency of Mr. F. M. Birks, C.B.E.

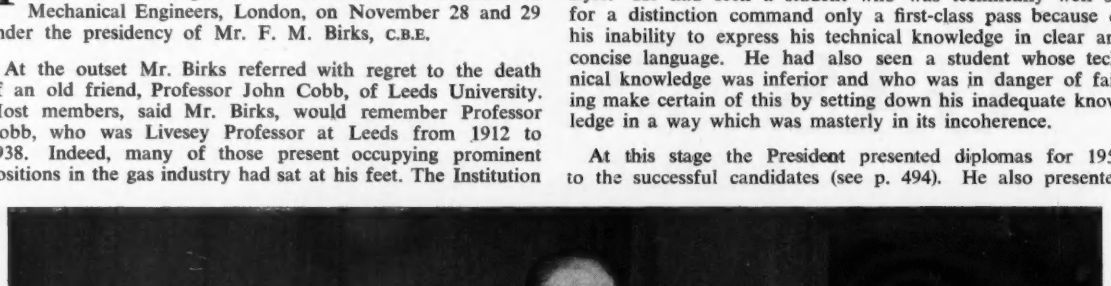
At the outset Mr. Birks referred with regret to the death of an old friend, Professor John Cobb, of Leeds University. Most members, said Mr. Birks, would remember Professor Cobb, who was Livesey Professor at Leeds from 1912 to 1938. Indeed, many of those present occupying prominent positions in the gas industry had sat at his feet. The Institution and the whole industry owed Professor Cobb a deep debt of gratitude for all the work which he did as a teacher and research worker.

The President then extended a cordial welcome to M. R. H. Touwaide, from Belgium, and to M. M. P. Agron, from France.

The first item on the agenda was presentation of the report of the Chairman's Technical Committee by Mr. C. H. Chester, who referred particularly to the invitation received from the Gas Council to provide a technical advisory service, which the Institution Council had been pleased to accept.

Next came presentation of the report of the Gas Education Committee for 1949-50, which was briefly introduced by Mr. John Terrace, who has been Chairman of the Committee since 1938. At the meeting Mr. Terrace handed over the mantle of office to Mr. J. H. Dyde, who feelingly expressed appreciation of the services which Mr. Terrace has rendered. Mr. Dyde mentioned changes which have taken place in the constitution of the Committee, which has been strengthened by additional representation from the Gas Council and from the Society of British Gas Industries. Dr. P. C. L. Thorne (Ministry of Education) also paid tribute to the untiring work of Mr. Terrace. Discussion on the report was bright and very much to the point, the tempo being set by an excellent contribution from the student's angle by Mr. H. E. Goodrich. The aspect of candidates' 'presentation and style' in answering examination questions was touched on by Mr. R. F. Hayman, himself a member of the Board of Examiners. It was no secret, commented Mr. Hayman that examiners, in marking a question, took due account of presentation and style. He had seen a student who was technically well set for a distinction command only a first-class pass because of his inability to express his technical knowledge in clear and concise language. He had also seen a student whose technical knowledge was inferior and who was in danger of failing make certain of this by setting down his inadequate knowledge in a way which was masterly in its incoherence.

At this stage the President presented diplomas for 1950 to the successful candidates (see p. 494). He also presented James Archibald Maclay Memorial Prizes to J. T. Murray (Dundee) and A. G. Pratt (Ipswich).



The President opens the Meeting. On his right is Sir Edgar Sylvester, Chairman of the Gas Council, Dr. W. T. K. Braunholtz, Secretary of the Institution, is on Mr. Birks' left.

Electrolytic Corrosion

The last item of the opening session was the 2nd Report of the Gasworks Safety Rules Committee on 'Electrolytic Corrosion and the General Theory of Corrosion.' In this report the importance is stressed of employing a competent authority on corrosion problems. It is pointed out that potential measurements between different underground structures are not in themselves indicative of the degree of danger to affected structures, but they do provide a pointer to danger areas that can then be subjected to more rigorous and quantitative tests. The potential measurement does not take into account the resistance of the path of the current flow; thus, it cannot in any circumstances be considered quantitative. For instance, 20 V potential under high resistance conditions can cause very much less damage than 2 V potential under low resistance conditions, so that while the Ministry of Transport Regulations prohibit leakage of a given order of potential, this is no criterion of the damage to be expected. Potential measurements are very useful in comparing the effects of any mitigation measures that may be taken.

Corrosion depends entirely on current flow, and if an accurate measurement of current flow to earth could be made it could be said that a true indication of electrolyte conditions had been obtained. Unfortunately, this is most unlikely, due to the elusive nature of current flow. Current measurements must, like potential measurements, be treated qualitatively and

used for comparison purposes only. Where earth bonding and grounding have been employed, current measurements do not even represent a qualitative measure of electrolysis, but they will, of course, indicate current flow in paths that may prove hazardous from the point of view of explosion or fire risks.

Generally speaking all tests should be long-term tests, and in the case of stray currents these should be related to a normal day's operation or some other complete cycle as a common basis for comparison. This can readily be seen when comparing the effects of tramway and railway leakages on frequent and infrequent running schedules. Again, it may be found that test results indicate changes of direction of current flow, and the frequency of such changes is of vital importance, realising that the corrosive process is reversible within certain limits.

Tests other than the simple potential or current tests are without question the province of the expert, but it must not be imagined that potential and current tests, because of their simplicity, are valueless. With practice, the uninitiated can become most adept at locating stray current electrolysis, and it may be said that this form of corrosion probably predominates on underground pipe work.

Turning to practical measures on works, the report comments that corrosion problems on gasworks are usually due to leakage from D.C. plant, liquor saturated ground, and faulty earth connections. All electrical plant can be the cause of leakage currents, and, apart from buried cables, all leakage is due to some form of 'tracking' that takes place between the live conductors or wires and the metal enclosures of the apparatus. Current then leaves by earth connections and becomes stray or vagrant, usually setting up electrolytic corrosion in its path.

The report goes on to say that the first and probably the most important measure to be taken is to see that all apparatus is installed with dust excluding casing, preferably cast iron, and thence maintained free from dust, particularly coke dust, which acts as a perfect conductor of electricity. In the case of D.C. electric motors, carbon dust is deposited inside the carcase of the machine, and this must be cleaned out regularly; cable entries that are not 'wiped' frequently allow the ingress of dust and, quite apart from being a safety measure, should be properly sealed, compounded and wiped. Periodic earth testing of all equipment should be carried out by means of a 'Megger', and if this procedure is rigorously followed little or no trouble will be experienced.

Once leakage current has established itself in an earth conductor or lead, it will flow back to the source of generation by the shortest possible route (*i.e.*, the lowest resistance path), and it would appear feasible to install some form of leakage indicating instrument so as to detect this return current at the generators. This can be done, but in practice too much reliance cannot be placed on this instrument, since faults of opposite polarity would neutralise one another and while being present on the system would not be indicated on the instrument. Providing, however, that they are installed with this weakness in mind they serve an excellent purpose and can be extremely useful in other directions also.

Regarding leakage from cables, it is bad practice to lay armoured cables direct in the ground unless special precautions are taken to lay the cables solid—*i.e.*, in earthenware troughs with compound filling and slab sealing. Overhead cables, though unsightly, are the obvious choice, and without exception all cables should be of lead-covered type, with steel wire or tape armouring. Earth leakage apparatus will detect any leakage, with, of course, the restriction mentioned previously.

It is usual, though bad in practice, to earth any piece of electrical apparatus to a local water pipe in the vicinity of the apparatus. Frequently, the connection has high resistance, and in any case its path back to the generator becomes devious, causing untold damage on its way. The better way is to use the lead sheath and wire armouring of the cables, making sure that all lead joints are wiped and that both lead and armour are bonded by a substantial copper strip. All outgoing cables from the generator switchboard will of necessity require bonding, and thence earthing to a substantial 'earth-pit.' This method is equally applicable to conduit installations, providing conduit joints are all screwed and tight so as to give good electrical continuity. This question of earthing is by far the most important feature of good installation practice and is one that is too frequently subject to shoddy work and resulting corrosion problems.

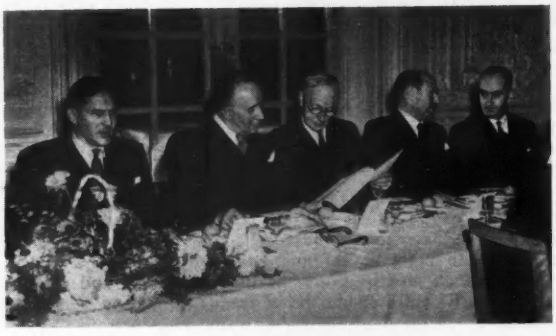
Discussing reaction anode protection, the report suggests that this method has a wide and useful application.

The meeting then adjourned. The Research Luncheon was held at the Savoy Hotel, and our report of the speeches appears on later pages.

Gasification of Petroleum Oils

Two papers were presented and discussed during the afternoon session of Tuesday, the first being by H. Stanier and J. B. McKean (South Eastern Gas Board) on the production of town gas by the catalytic gasification of petroleum oils. In their introduction to the paper the authors remark that the use of petroleum oil as a raw material auxiliary to coal in the manufacture of town gas is a practice well established through the medium of the carburetted water gas process, but it is only comparatively recently that much attention has been

Left to right: Sir Ernest Smith, Mr. G. le B. Diamond, Miss K. M. Halpin, Sir Charles Ellis, Dr. R. S. Edwards, Mr. J. W. Stitson.



Left to right, Mr. N. J. Pugh, Mr. G. E. Currier, Sir Harry Lindsay, Professor D. M. Newitt, Mr. W. K. Hutchison.

given to processes using petroleum oil as the sole raw material. Because of its oil supplies, America has taken the lead in the development of such processes. Increasing understanding of the problem of peak load gas supply, and concern at the high cost of gas made to meet peak demands have stimulated interest in oil gasification in this country. The paper by Messrs. Stainer and McKean is a record of work carried out with a view to developing a peak load gas manufacturing process starting from petroleum oil and directed, in the first instance, to the production of a gas with characteristics so little different from those of the gas normally supplied as to avoid any need for limiting the proportion in which it may be used.

The discussion during recent years of the problems and, particularly, the economics of peak load gas supply has yielded sufficient information to define the features desirable in processes intended for peak load production. While the operating costs and the costs of raw materials cannot be ignored, what is of the greatest importance in such processes is that capital and other fixed charges on the plant should be low, as it is these charges that add so much to the cost of the gas at low load factors.

It is the space heating load that gives rise to the embarrassing peaks, and it is this load factor that should be considered in relation to the cost of operating peak production processes. For the generality of gas business, excluding the heating load, annual sales equivalent to 240 maximum days may be expected, whereas the full space heating load gives an annual sales equivalent of only about 100 maximum days. (Partial space heating confined solely to topping up may give a much worse load factor.)

Comparing these two figures of 240 and 100, it will be seen that, if the capital and other related fixed charges per therm of gas are to remain unchanged, the capital cost of the heating load plant must not be more than 40% of that of a plant of the same output supplying the general load. Moreover, if owing to the high cost of the raw materials used, the running costs of the peak load plant are above those of the plant supplying the general load, as may be the case if the lighter fractions of petroleum oil are used instead of coal, a further reduction in the capital cost of the peak load plant will be needed to avoid an increase in the cost of gas production. There is clearly every incentive not only to construct the peak load plant and operate it as cheaply as possible, but also to use one of the cheaper forms of petroleum oil, such as a heavy fuel oil, as the raw material.

Although the initial purpose in using petroleum oil as a supplement to coal was to meet the difficulties associated with peak demand, there have been occasions in recent years when the inadequacy of coal supplies has compelled the use of petroleum products to compensate for the shortage of coal. The planned increase in home petroleum refining will place upon the market in this country an additional 5 mill. tons a year of heavy oil remaining after the motor spirit, kerosene, diesel oil, and lubricants have been recovered. Whether this quantity of heavy oil is to be regarded as a competitor or a supplement to indigenous fuels must depend upon the point of view.

It is significant that the work described in this paper foreshadows the possibility, in simple plant, of producing at least 1.25 therms per gall. (300 therms per ton) of 500 B.Th.U. gas having characteristics similar to those of normal town gas, using as raw material heavy petroleum fractions.

In the work described in the paper, a pilot plant was designed using as catalyst a mixture of bauxite, calcium carbonate, and bauxite. The experiments were successful in establishing the practicability of the process and confirming the results of the laboratory experiments with gas oil. They also showed that equally good results could be obtained with one of the heaviest types of petroleum fuel oil. An experimental unit for the production of about 1 mill. cu.ft. of gas per day, of a calorific value of 500 B.Th.U. per cu.ft., has been erected for the further investigation of the process on a full working scale. Taking a conservative estimate of the gas yield at 1.3 therms per gal., and assuming that the process will be self-supporting in steam and other heat requirements, as seems most likely, it is computed that, as present prices of heavy fuel oil, it should be possible when working on full load to produce oil gas at a price competitive with that of base load coal gas. For peak loads, oil gas should be considerably cheaper than coal gas. Thus, there is the possibility that not only may the process considerably reduce the cost of supplying peak load gas, but it may also provide an alternative to gas manufactured from coal, particularly in areas where the transport of coal and coke makes these fuels very costly.

Pre-Stressed Concrete

The other paper on Tuesday afternoon was by S. V. Gardner (North Thames Gas Board) on the application of pre-stressed concrete to structural and building work in the gas industry. Summarising his paper the author said that pre-stressed concrete has, to some extent, come somewhat suddenly to the forefront in the engineering world, as though it were perhaps a new discovery or possibly a panacea for the shortcomings of traditional methods. Neither of these suppositions, he contends, is correct, the basic principles having been developed slowly, but surely, over the last 64 years, while engineers are still in search of the ideal. Considerable claims are made, however, in favour of pre-stressed concrete construction, and the author believes that these are not without foundation.

Mr. Gardner's paper describes works that have already been completed, or are now in hand, so that the engineer may be able to assess the relative merits of each of the projects for himself, when compared with similar works carried out by more conventional methods. The author mentions that pre-stressed concrete has now been in use in various forms of construction for at least 20 years, although a considerable impetus has been given to it in the post-war period, both by shortages of materials, particularly steel, and also by the inherent faith of those intrepid pioneers of the subject, and their ardent followers.

Conditions on the various works within the gas industry are generally more severe than those encountered in many other spheres, and the engineer is always desirous of improving the external fabric of the structures under his control so as to minimise the corrosion, deterioration, and disintegration so common. On account of the state of compression induced in concrete by pre-stressed reinforcement, the cracks that are always present in reinforced concrete construction become almost entirely eliminated. Furthermore, in view of the high pre-stress necessary to outweigh the various losses due to creep, shrinkage, and elastic deformation, the concrete used must be of higher quality than has been required previously. These factors constitute a definite advantage to the engineer concerned with the design and maintenance of gasworks plant. Other advantages to be expected are the considerable saving in steel and the reduced size of many structural members, accompanied by a saving in cost.

At present, this type of construction has been successfully

used for piles for land foundations, fender piles and dolphins for river work, and gantries and open-frame trestles for supporting mains and services, in addition to its normal use in framed buildings and structures. More specialised types of structures have also been considered, and among these are circular tanks, including gasholder tank foundations, caissons and cofferdams, large-diameter pipes, tunnels, and also purifiers. The author points out that before embarking on such projects the engineer should appreciate that pre-stressed concrete is a more precise form of construction than reinforced concrete, consequently needing greater care and supervision in the constructional stages. Standards and codes are not yet available to guide the engineer, and he is left to rely on his own experience and that of the firms specialising in the subject, to ensure a satisfactory result. This, says Mr. Gardner, should not deter one from forging ahead and grasping at the advantages which are offered. He concluded his summary thus: 'Much can be done by the specialist designers and contractors, to reassure the engineers concerned, either by technical discussions or the exhibition of works already completed, so that every project may demonstrate in no unmistakable way that pre-stressed concrete, although still open to development, will become one of the leading forms of construction of the future.'

Theory of Fluidisation

First item on the programme on the Wednesday morning was presentation of the Gas Fellowship Report by Dr. E. Johnson. This considers a theory of fluidisation and its application to sulphur recovery by solvent extraction. In the report the work of previous investigators on the fluidisation of solid particles with air and water having been reviewed, a mathematical theory of the mechanism of fluidisation is advanced. The theory was developed from considerations of the free fall of a single sphere in a viscous fluid, the sedimentation of suspensions of solids in liquids, and by regarding a bed of fluidised solid merely as an expanded static bed. Experimental data have been obtained in respect of carborundum, coke, alumina, and spent oxide fluidised by air, water, and a glycerine-water solution. The effect of particle size, solid density, fluid density, fluid viscosity, and bed mass were investigated in turn. In addition, the fundamental effect of fractional voids and particle shape upon the velocity for initial fluidisation was noted. Using the fluidised solids technique a laboratory process has been developed for obtaining, from spent oxide, (*a*) a sulphur product of 95% purity, and (*b*) an extracted oxide that has a reactivity to hydrogen sulphide not greatly different from that of the original material. A large-scale fluidised process is proposed for extracting sulphur from spent oxide in order that it may form part of an integrated fluidised purification and extraction process.

Adjustment of Gas Appliances

There were two papers at this session, the first to be presented being by F. E. Mills on the adjustment of gas appliances. The purpose of this paper was to show how appliances may be designed and adjusted so that variations in gas characteristics may have as little effect as possible upon their performance and safety. To this end we must know the mean value of the characteristics of a gas, together with the extent of any variations about the mean value; and part of the paper is given to a description of one method, obtaining a picture of the conditions, by expressing the results in the form of frequency curves and by calculating the standard deviation. Again, we have to know the tolerance of an appliance to changes in the characteristics of the gas supplied, once it has been properly adjusted. A section of the paper is devoted to this aspect. In a further section, the principle is established that an appliance will give the greatest service, whatever its tolerance to changes in characteristics of the gas, if it be adjusted to give its best performance when the gas is at its mean value. The application of this principle to the adjustment of gas rate is discussed further and it is shown that the most satisfactory way of achieving a desired result is to provide an appliance with a governor and fixed orifices. If this is not possible, adjustment of burner pressure is to be preferred to adjustment by timing of the meter. The application of the principle to the adjustment of aeration is considered, and again the provision of governors and fixed aeration controls is preferable. For those appliances that require adjustment *in situ*, or for checking the adjustment of those with fixed controls, the author states that the flame matching burner provides a means of ensuring compliance with the principle. The paper concludes with a few notes on the use of the flame matching burner by other boards, together with some data on the characteristics of peak-load oil gas.

Implication of Combustion Research

The other paper was by Dr. J. E. Garside, of the Gas Research Board, who set out to explain how modern combustion research is contributing to the solution of current problems of gas utilisation. In the paper the field of relevant research has been divided into six sections dealing with flame propagation, flame stability, mechanism of combustion reactions, heat and energy release, heat and energy transfer, and ignition of gas—air mixtures. At the beginning of each section, one or more leading questions have been asked, the answer to which, if applied correctly, should, in the author's view, lead to the wider and more efficient utilisation of town gas. An attempt has then been made to answer the questions by explaining the findings to date of current researches in this country and correlating those findings with the results of similar projects overseas. The treatment has revealed the achievements and limitations of the investigations reviewed.

Refractory Materials

Wednesday afternoon was given over to the report for 1949-50 of the Refractory Materials Joint Committee of the Gas Research Board and the British Ceramic Research Association and a further G.R.B. communication, this being concerned with the measurement of the wind load on a spirally guided gasholder (presented by W. A. Simmonds).

The first report followed the pattern adopted last year when two only of the research projects were selected for a comprehensive review, all other investigations being briefly summarised.

This year it was again decided to describe fully the work concerned with the problems of flaking in continuous vertical retorts, and the first paper in the report is a continuation of the investigations described in the previous report. In the latter it was thought that a notable advance had been made with the problem, and in the intervening 12 months priority has been given to the active pursuit of this work. Earlier laboratory investigations had shown that when carbon is deposited on specimens of silica material, flaking is more likely to occur if the temperature is fluctuating between 800° to 1,000° C than if steady temperature conditions are maintained. Great importance must be attached, therefore, to the temperature variations occurring in the flaking zone of con-

Left to right: Mr. O. R. Guard, Dr. D. T. A. Townend, Mr. R. N. Quirk, Mr. H. F. H. Jones.

tinuous retorts. During the last 12 months, a temperature survey has been made on a newly built retort by means of thermo-couples inserted at one end of both the major and minor axes of the retort in the flaking zone. At the rated throughput, average temperatures at the flue and carbonising faces of the retort, 3 ft. from the top, were 900° C, while 9 ft. down they were 1,130° and 920° C. During scurfing operations, temperatures rose to 1,050° and 1,100° C, carbonising face temperatures equalling or even slightly exceeding the corresponding flue temperatures. It is considered, however, that the daily variations in temperature are probably of greater significance, these variations averaging 240° C 3 ft. down the retort, and 140° C 9 ft. down the retort.

The second project is a long-term investigation that aims at obtaining more precise knowledge of the clay—quartz system, this being the fundamental system governing the properties of siliceous and semi-silica refractories. Experiments are reported in which the rate of conversion of pure quartz has been measured in the presence of the mineralising oxides Al_2O_3, Fe_2O_3, TiO_2, CaO, MgO, K_2O, and Na_2O added in the molecular ratio of one part of oxide to 200 parts of quartz. After prolonged heatings, mainly at 1,350° C, of all mixtures except those containing alkali oxides, it was found that the quartz converted directly to cristobalite, but when alkali oxides were present the products of conversion contained tridymite in addition to cristobalite. With most mixtures the disappearance of quartz was found to be unimolecular in character, although the rate of disappearance did not always correspond with the rate of appearance of cristobalite. In certain mixtures the low-density form of silica continued to be formed in appreciable quantities after the quartz phase had disappeared. It is possible that during the conversion a transition phase is produced consisting of silicon and oxygen atoms arranged in a random manner and that the nuclei of cristobalite are formed from this. Potash was found to be a more active mineraliser in promoting tridymite formation than soda, and it is suggested that in this connection the radius of the metal ion in the mineraliser may be of importance and actually form an integral part of the tridymite structure.

Much is still obscure concerning the silica conversions, and the investigation is rendered difficult by the absence of any reliable method of estimating quantitatively the proportions of cristobalite and tridymite. Fortunately, differential thermal analysis has been found to give reliable quantitative data with respect to quartz.

This and all other investigations on the clay—quartz system reported to the Refractory Materials Joint Committee have been carried out, for the British Ceramic Research Association, at the University of Leeds, under the immediate supervision of Professor A. L. Roberts.

Wind Load on a Gasholder

Finally we had Mr. Simmonds's communication. In this the author points out that the main effects produced by the wind on a spirally guided gasholder are a lift force acting vertically upwards on the crown, a drag force on the crown acting horizontally in the opposite direction to the wind, and a drag force acting horizontally in the direction of the wind on the circular sides of the inflated lifts and tank. There is also a small lateral force, which is usually negligible. The result of these forces is to produce a translational force on a gasholder in the direction of the wind, a lift force vertically upwards on the crown, an overturning moment tending to tilt the holder, a shearing force, and a distorting force. The drag force on the sides of the holder is composed of two parts; the larger is the resultant of the normal pressure of the wind on the holder surface, which is a drag force known as the form drag. The smaller is due to the tangential velocity of the air past the holder, which causes a frictional force on the holder surface known as the skin friction drag. All these forces with the exception of the skin friction drag may be calculated from the normal pressure exerted by the wind over the holder surface.

The measurement of the wind pressure is complicated by the variability of the direction and force of the natural wind, by the nature of the surroundings, and by the characteristics of the holder, in particular its large size and the fact that it is a floating structure built so that its parts can move relative to one another, and its interior is sealed from the atmosphere. For these reasons pressure measurements on a full-scale holder have not hitherto been attempted.

The problem has been approached, however, by the examination of models exposed in a wind tunnel. If the scaling effects in applying the measurements made on a model to a full-scale could be determined this method would form a convenient and economic means of determining wind stresses on gasholders of different sizes. It was realised that, before such correlations could be made with certainty, it was necessary to conduct experiments on an actual holder and compare the distribution and magnitude of the normal pressure observed with those previously obtained from a model. The primary object of the work described in this paper has been such a comparison.

A spirally guided gasholder of 1 mill. cu.ft. capacity was selected to which the wind has a relatively uninterrupted approach from the direction of the prevailing (south westerly) wind, in order that the conditions should be as similar as possible to those in a wind tunnel. This holder has been equipped with the necessary pressure measuring devices, and a number of wind pressure measurements have been made. A detailed account is given in the paper of the apparatus installed on the holder to measure the normal pressure of the wind on a horizontal section of the holder, and the methods adopted to overcome the difficulties associated with (*a*) the insertion, in the surface of the inflated holder, of orifices for the measurement of the normal pressure of the wind, (*b*) the transmission of the pressure at such orifices across seals between the holder lifts to a central recording position, (*c*) the recording of the pressures at these orifices during periods of high wind when there are rapid variations in wind velocity, (*d*) the measurement of the static pressure of the atmosphere, and (*e*) the determination of the wind velocity.

The measurements obtained have defined the distribution of normal pressure around a horizontal section of the holder and provided data for the calculation of the form drag coefficient for this section. Outside the region affected by end effects, the variation around the circumference of the holder of the difference between the normal pressure of the wind on the holder surface and the static pressure of the air is known to vary from a maximum positive value (equal to the full dynamic pressure of the wind) at the point on the holder surface facing the wind, through zero to a maximum negative value at an angle of very approximately 90° around the holder circumference from the position of maximum positive pressure and then to decrease towards the rear portion of the holder.

It has been established that the form drag coefficient for the section of the holder on which the measurements have been taken is independent of the wind speed (and consequently of the Reynolds Number) over the examined range of 15 to 40 m.p.h., and also of the direction of the wind, in regard to the holder, over a range of 100°, providing the approach of the wind is relatively unobstructed. The mean value of the form drag coefficient is 0.47, but it varies to the extent of ±10% with the position of incidence of the wind within each of the bays forming the spaces between two adjacent spiral guides. The maximum value for the form drag coefficient which is of especial importance in design, is therefore 0.51.

It has also been found that when the wind approaches the holder from a direction in which its approach is obstructed by high land there is an appreciable decrease in the form drag coefficient. In the case of the Brentwood holder, when the wind is from the north east the decrease in the form drag coefficient is 30%.

The magnitude of the maximum negative pressure varies considerably with the direction of the wind relative to the

holder, but has never exceeded the dynamic pressure of the wind. The position around the holder at which these maxima occur also varies considerably with the wind direction.

Comparison of the results on the model and full scale shows that the mean values of the form drag coefficient for the horizontal section of the full-scale holder and the comparable section of the model were both 0.47. The general form of the variation of normal pressure around the holder was the same for both model and full scale, and the positions around the holder at which the normal pressure equals the static pressure and at which the maximum negative pressures occur are similar on both scales. The pressure on the rear portion of the full-scale holder is approximately equal to the static pressure of the atmosphere, but in the case of the model it is negative—*i.e.*, a suction—and has a magnitude of about 20% of the dynamic pressure of the wind.

From the measurements so far taken it appears probable that the total drag coefficient for the full-scale holder will be rather greater than 0.52$_5$; this coefficient was estimated to be 0.55 from the N.P.L. model experiments, and 0.52 from earlier model experiments.

The force exerted by rain and hail on the sides of a holder has been calculated for the greatest rate of precipitation likely to occur in this country, and it is found that, at high wind speeds, the rain force will not exceed 2%, and the hail force 4% of the wind force.

Normal pressure measurements will be continued to obtain data at higher wind speeds, over a wider range of wind directions, if the opportunity occurs, and also on the effect of a refinement in the experimental technique. The values of the lateral force coefficient for the data available are being investigated.

In the future development of this work it is intended to take normal pressure measurements for other levels on the walls of the full-scale spirally guided holder, so that the form drag coefficient for the complete holder may be assessed; on the crown so that the lift force coefficient may be determined; and at special points on the holder where extreme local pressures may occur. Finally, an attempt will be made to estimate the skin friction drag coefficient; this would complete the evidence for a full evaluation of the wind pressure problem, and enable the actual stress in the various parts of the structure to be determined.

F FOR FREDDIE; S FOR SUGAR

AFTER a transient frown, our mood passes to one of considerable sympathy for our grown-up daughter *Gas Service*. We ourselves have suffered the slings and arrows of outrageous fortune; did not our rather delicate '*soupçon* of heat' become a 'soup can of feet' in the last stages of going to press with an issue of the *Journal* not so long ago. Then the learned doctors smiled after their first bewilderment; now, page 526 of *Gas Service* for December sets a new problem with its beautifully laid out article on 'Wales Sitters at Stechford.' We ourselves were abstractedly admiring the effect last Thursday when Mr. Evan David Williams of X, near Pentre, came through to ask if we could publish a correction. It seems that Mrs. Williams started breakfast by remarking: 'Look you, Dai, I thought it was for work you went to see Mr. Broad in Birmingham.' Our further trouble lies in being taken for an agency for worthy men who wish to turn an honest tax-free shilling subbing for cinema-minded parents.

But this is the headache of Editor, *Gas Service*. For late news by telephone he must learn to spell phonetically. Any time now we ourselves may have our own headache, trying to cope with Sir Edward Silvaner and Colonel Harold Smithells. But after this general explanation of the disadvantages of journalism in 1950, we would suggest that after all it doesn't much matter whether the Rhondda Valley, as recorded in *Gas Service*, frittered or littered, or just sat. On the long journey from that unique countryside, they probably sang in anticipation of a first-class sin and jitters with Mr. R. J. Rogers. No, it's Editor, *Gas Service*, who has missed a sitter, and for our part we are thankful to have lost none of the goodwill of the Parkinson Glove Company, of Stretchforth.

Personal

Alderman **R. Farrell,** F.A.C.C.A. (Worthing) and Alderman **J. A. Larby** (West Ewell) have been appointed members of the South Eastern Gas Consultative Council.

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Mr. **Edward Charles LeJeune,** M.S.E., M.SOC.C.E. (France), M.INST.GAS E., has been awarded a Certificate of Merit by the Society of Engineers for a paper which he recently gave to the Society entitled 'Some Aspects of Gas Supply.'

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Mr. **C. H. Bailey** joined the staff of Falk, Stadelmann & Co., Ltd., London, as a junior clerk in 1890 at the age of 15, and was appointed Manager of the Illuminating Glassware Department in 1896, an appointment he has held to the present day. Mr. Bailey will be relinquishing the management of the department at the end of March, 1951, but will attend the office for active consultation.

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Mr. **A. H. Robson,** of Rugby, has been appointed to fill the vacancy of foreman gasfitter at the Llanelly undertaking. The vacancy was caused by the retirement, at the age of 68, of Mr. **Graham Phillips,** who had successfully filled the post for the past 28 years. Mr Robson received his early training at the Colne gasworks and subsequently served with the Rugby gas undertaking.

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Mr. **Denis W. M. Allen** has been appointed a Director of W. H. Allen, Sons & Co., Ltd., Queens Engineering Works, Bedford. The only son of the late Mr. Melville Allen and grandson of Sir Richard W. Allen, C.B.E., D.L., the company's present Chairman, and great-grandson of the late Mr. W. H. Allen, the founder and first Chairman of the business, Mr. Denis Allen is the first of the fourth generation of the Allen family to become a member of the Board of Directors.

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Mr. **John R. Barralet** has by agreement with Barralets, Ltd., resigned from the Board and from his position as Managing Director. Mr. **Percy Wing** and Mr. **Colin E. Barralet** have been appointed Joint Managing Directors. Mr. Wing is an original Governing Director of the company and has been joint Managing Director until the beginning of this year. Mr. Colin E. Barralet had been employed by the company for 20 years and for many years was manager of the repair and service depot until he resigned two years ago.

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Mr. **George Clark,** O.B.E., J.P., was presented with a handsome bronze plaque in recognition of his life of service to the Bryan Donkin Co., Ltd., Chesterfield, before a representative gathering of staff and workmen in the canteen on November 29. At the same time a replica was unveiled by Mr. D. M. Henshaw, Chairman of the Company. It will be placed in the vestibule of the offices. The plaque is of Mr. Clark in profile and the inscription on it records that he joined the company in 1893. He was Managing Director from 1908 and Chairman from 1938 to 1949. It is also recorded that the plaque is to be erected by the Directors, staff, and workpeople in recognition of his great contribution to the success of the company, and to the welfare of the employees during his 56¼ years' active association with the Company. Having unveiled the plaque, Mr. Henshaw spoke of Mr. Clark's great service to the firm and his inspiring example to everyone. They all wished him long life and well-being. In reply Mr. Clark spoke of the happiness and satisfaction that his long association with the Bryan Donkin Co. had brought him.

Mr. **Alex E. Morris,** B.SC., M.I.MIN.E., has been appointed to a seat on the Board of Gas Chambers and Coke Ovens, Ltd.

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Councillor Mrs. **F. H. Cantwell,** J.P., has been appointed Chairman of the Domestic Coal Consumers' Council. She is a London housewife with an excellent record of public service, and has been a member of the Islington Borough Council since 1934. She became Chairman of the Public Health and Cemetery Committee last year and for over ten years previously was Chairman of the Maternity and Child Welfare Committee. Mrs. Cantwell is also a member of the L.C.C. Health Committee.

Obituary

JOHN WILLIAM COBB

Mr. CHARLES F. BOTLEY writes:—

In your obituary notice of Professor Cobb with the well deserved tribute to his work on behalf of the gas industry you could not, as you say, mention all his many activities.

I would therefore like to add my testimony, for it was my good fortune and privilege as a member of the Joint Research Committee of the University of Leeds and the Institution to be in close association with him and so able to appreciate the services he rendered. He was *inter alia* one of the first members of the Liquor Effluents and Ammonia Committee in 1926 and was good enough to act for some time as Honorary Secretary to the Committee. He maintained his interest in its work until its activities were terminated by the Council of the Institution last January. It was due to the University of Leeds and Professor Cobb that the Committee had the benefit of the services of three valued research chemists in succession —viz., Dr. A. Parker, Dr. A. C. Monkhouse and Dr. A. Key.

Dr. H. HOLLINGS writes:—

I know that all the older members of the Fuel Department at Leeds will wish to join with me in a tribute to the sincere friendship of John William Cobb. He was always ready to listen to any research assistant or to any student who sought his help. It mattered not whether his guidance was needed in the prosecution of some study or in connection with some more personal problem. Cobb gave freely of his time to consider the matter in all its facets, and one reaped the benefit of his experience and sagacity.

Perhaps it suited his temperament that when he was given charge the Department was so small for it appeared natural to him to take a close personal interest in all its members. If work was going well and one had some little triumph, his share in the pleasure was quite obvious; if another suffered some personal grief he was just as ready to hold out the steadying hand of an elder brother. It was typical of him to ask that the money raised for a presentation on his retirement should be applied for the benefit of students who, through misfortune, might be in need. Under his leadership, always unassuming and unselfish, indeed generous in the recognition of others, the Department expanded rapidly and to-day there are many old students who remember with gratitude the privilege of his last friendship.

Professor Cobb always took a very broad view of the function of a University, and his interests extended far beyond the particular industry with which his Chair was associated, and indeed far beyond the realm of technology. No doubt reference will be made elsewhere to his great services to the cause of education, to his University and to technological research. I would, however, like to record my impression of him as the seeker after truth. He always strove for a concise and indeed for a precise statement. He disliked any ambiguity, he was quick to detect any inaccuracy of statement or any circumvention, and he abhorred pretence and pretension.

We salute the passing of a fine man, with a realisation that we are the richer for having known him.

Dr. F. J. DENT writes:—

The Livesey Chair at Leeds University gave Professor Cobb the opportunity for the life he most desired, and he accepted it with confidence and serenity. He delighted in the University and its affairs as well as in his relations with industry, displaying in outstanding measure the matured qualities of a cultured and scholarly gentleman. So he commanded the greatest respect.

But, as one of his students, I shall remember him as the most lovable man I have ever known. There was an exquisite sympathy in the way he bestowed on us the kindness and consideration which were so much a part of him. At all times we had his advice and wise judgment and never did our hearts warm to him more than when we had evoked his criticism; it was so fair and just. Our trust in him was absolute and we worked the harder.

To be associated with him illuminated our existence. Encouragement and guidance came with a rare understanding and the pursuit of our studies grew into the most absorbing occupation. The desire to achieve something, however small, in the renowned tradition which he built up at Leeds was our greatest inspiration.

He had an inborn appreciation of the simplicity of natural laws and his researches were in keeping with their beauty. How typical of him were the classical analyses of combustion and manufacturing processes, in which no pains were spared in the search for accuracy. How much did we strive to satisfy his exacting requirements.

Professor in presence and bearing, yet he came from industry and, indeed, fostering a vigorous association through research between University and industry has been one of his great achievements. This work lives on and will continue, for while it was pioneering in his day, it is now recognised as giving a relationship of the greatest potentiality. Professor Cobb's students are justly proud of having been there during the infancy of this development as they are of its result, that they themselves have been prominent in the technical growth of a great industry.

Mr. H. J. HODSMAN writes:—

My recollections of Professor Cobb date back to 1906, when, as an undergraduate, I spent a summer vacation in the laboratory of the Farnley Iron Company, of Leeds. I was engaged on some small investigation of the Mond gas plant there installed. I was even then impressed by the technical attainments for which he was already known. After entering the Yorkshire College in 1889, later to become the University of Leeds, he graduated in the University of London at the age of 19 and entered the service of the above mentioned company. His task was to create an atmosphere of scientific control in a works peopled by craftsmen. The manufactures were (a) the so-called 'Best Yorkshire Iron'—*i.e.*, a wrought iron—and (b) high grade clayware, both glazed and otherwise. The company was a progressive concern having an installation of Mond gas plant with ammonia recovery. Apart from the advantage of the excellent teachers of science which were available at the college, he was left to his own resources at the works. Nevertheless, the range of equipment developed in that works provided what was a very effective range of chemical engineering, to use modern terms. Looking back, it is not surprising that, in seeking a successor to Professor Bone, it was decided that no better choice could be made than John Cobb. This was confirmed by experience, especially in view of the difficulties which arose.

After two years only, war broke out, and half the small number of students went into the army. During that war, the system of organised research on gas manufacture was begun, and has continued ever since. The control of this was a valuable service, the effectiveness of which may well have been largely due to Cobb's early industrial training. His Department made steady progress, hampered somewhat financially by the slump in the inter-war period. On retirement in 1938 he could look back to a remarkable academic and technical achievement.

I venture to suggest that those familiar with Professor Cobb will recall as his most valuable characteristic the cautious but sound judgment which he gave to all his problems, whether technical or in the University. Even after retirement he used to make useful contributions in committees which he attended, even to the last month.

Dr. D. T. A. TOWNEND writes:—

I was deeply sorry to learn of Professor Cobb's death on November 6, for until quite recently, having in mind his years, he showed remarkable vigour. We last met at the University in July during the visit of the Joint Research Committee of Leeds University and the Gas Research Board; it was clear that he still maintained the keenest interest in the work of the staff, for he then gave freely from the wealth of his judgment and experience.

Before being appointed (1938) to the Livesey Chair in succession to Cobb, I had not known him personally; indeed, we met for the first time when he attended, as a member, the meeting of the Council of the University at which my appointment was announced. A close friendship at once

sprang up between us, and I treasure memories of his kindly counsels and continued keen interest in the work of the Department; he was always delighted when one called in to see him, and his wife and two daughters were charming hostesses.

When taking over his 'den,' I was much impressed with the numerous reports, mainly on the work of the Joint Research Committee and the Institution Gas Research Fellows; these occupied much of the shelf space and alone spoke wonders of the service rendered to the gas industry during his long period of office. There can be no doubt that Cobb made these activities his major interest, and on more than one occasion he recounted with pride how the various researches had proceeded from early days, step by step, until on my arrival they were concerned mainly with high pressure gasification, combustion characteristics, and gasworks effluents.

It was clear that throughout this time he had selected first-class investigators and thrown himself intimately into their tasks. Within the Department proper he had trained many generations of men who afterwards rose to senior positions within the gas industry and elsewhere. The interests of the Department were wide, and he had pioneered investigations not only into the immediate problems of the gas industry but also into refractories and metallurgy; in this connection one recalls, for example, his classical work on 'the synthesis of a glaze' and on 'the scaling of steels in furnace atmospheres.'

I am sure his tasks could not always have been easy, for during the inter-war years the funds available within the civic universities for training in technology were not great, and what was achieved must have called for unusual resource and ingenuity. Indeed, I soon found that we had been much better off financially at South Kensington.

Cobb's services to the University as a whole were no less distinguished. He lived through a period in its history of great expansion; and in provincial universities a professor has not only to run his own Department but contribute to the administration as a whole. In this he excelled, having served at one time or another, as pro Vice-Chancellor, Dean of the Faculty of Technology, and member of Council and Senate, as well as of other important committees. He held the confidence of his professional colleagues, and had been frequently selected as their representative in difficult negotiations. He was clear headed and forthright—indeed, a statesman of a high order. We all greatly treasure his memory. *Vale magister præclare.*

Diary

Dec. 7-9.—National Poultry Show: Olympia.

Dec. 7.—Industrial Gas Development Committee: Gas Industry House, 9.30 a.m.

Dec. 8.—Northern Junior Gas Association: Short Paper meeting, Darlington.

Dec. 8.—London and Southern Junior Gas Association: 'Aerated Gas Burners,' E. E. Blandon and J. V. Rigg, 178, Edgware Road, W.2, 6.30 p.m.

Dec. 12.—Wales and Monmouthshire Junior Gas Association: Meeting, Aberdare. Paper by D. T. Phillips (Mountain Ash).

Dec. 12.—Midland Junior Gas Association: Meeting, Birmingham. Paper, 'Thirty Years of Carbonisation,' J. Foxton (Cheltenham).

Dec. 16.—Yorkshire Junior Gas Association: Short Paper Meeting, Bradford.

Dec. 18.—North Eastern Gas Consultative Council, Bridge Street, Leeds, 2.45 p.m.

Jan. 12.—London and Southern Junior Gas Association: 'The Performance of Continuous Vertical Retorts,' C. H. Lewis, 178, Edgware Road, W.2, 6.30 p.m.

British Tar Confederation

At the annual general meeting of the British Tar Confederation, on November 22, the following officers were elected for 1950/51: *President:* Colonel H. C. Smith, C.B.E. *Hon. Treasurer:* C. E. Carey. *Chairman of Executive Board:* Sir Walter Benton Jones. *Vice-Chairmen of the Executive Board:* W. K. Hutchison and Major A. G. Saunders.

The Executive Board consists of 10 representatives each nominated by the Association of Tar Distillers, the British Association of Coke Oven Tar Producers, and the Gas Council, as follows:

Association of Tar Distillers: L. W. Blundell, C. E. Carey, E. Hardman, Capt. C. W. Harriss, C. Lord. Wm. McFarlane, S. Robinson, Major A. G. Saunders, L. Shuttleworth, W. A. Walmsley.

British Association of Coke Oven Tar Producers: A. Bradbury, G. W. J. Bradley, W. Robson Brown, M.P., K. McK. Cameron, F. W. O. Doddrell, C. F. Dutton, G. A. Hebden, Sir Walter Benton Jones, BART., Leslie O'Connor, C. F. Sullivan.

Gas Council: S. Black, F. Boardman, D. D. Burns, J. H. Dyde, W. K. Hutchison, Alex W. Lee, A. McDonald, M. Milne-Watson, D. P. Welman, S. E. Whitehead, O.B.E.

Temporary Local Rationing of coke has been introduced by the Oxford and District gas undertaking. This year there has been a heavy demand for coke, which has arisen earlier than usual, and in order to be as fair as possible the undertaking has put the rationing scheme into operation.

The Battery of 54 W-D Becker coke ovens forming part of the new Vanderbijl Park Steelworks in South Africa has now been put into operation. This complete coke-making installation, which will carbonise over 1,100 tons of coal per day and cost some £1,500,000, includes coal and coke handling equipment and comprehensive by-products recovery and treatment plants. It is the fifth coke oven installation to be built for the South African Iron and Steel Industrial Corporation, Ltd., by the Woodall-Duckham Company.

From the Canadian Gas Association we have received a copy of the August 5, 1950, Directory of Approved Gas Appliances and Listed Accessories, which covers all such equipment that has been approved by the Association for the year 1950. Considerable delay was occasioned this year in issuing this directory, largely owing to some manufacturers not being in a position to supply their complete lists of approved goods, or from delays at the testing laboratories caused by heavy backlog of goods awaiting tests and approvals. However, approved appliances and listed accessories shown in this directory are fully approved and listed up to and including the date of issue of the 1951 edition, which is expected to be published on or about June 1, 1951. A supplement to this Directory may be issued on or about December 1. The directory has been prepared for the convenience of all those interested in the purchase and/or sale of gas appliances, gas tubing, and gas appliance accessories.

Process Instrumentation

Courses in this subject have recently been initiated by the Fuel Department at the University of Leeds. The course, which will ultimately be taken by all degree and post-graduate diploma students in the subjects of gas and chemical engineering, ceramics, and process metallurgy, is to be given in two parts. The first part, which has commenced in the current session, is 'The Measurement of Process Variables,' and deals with principles and methods of measuring such quantities as pressure, temperature, fluid flow, etc. The second part, 'Automatic Control,' will start in the following session and will deal with the theory and practice of automatic controls as applied to the process industries.

These lecture courses, in common with other lecture courses in the University, are open to external students by arrangement with the Department of Extra-Mural Studies.

At the Invitation of Mr. J. S. Marshall, Lincoln, sub-divisional manager of the East Midlands Gas Board, Mr. G. F. Jenkins, sales manager of Main Water Heaters, Ltd., recently gave an illustrated lecture on the firm's storage and instantaneous water heaters to the distribution and fitting personnel of the subdivision. Interest was shown in the sectional model of the special thermostat which is a feature of the storage type, and also in the robust construction and special burners of the instantaneous types.

Higher Standards in Education

SPEAKING at the Sixteenth Research Luncheon of the Institution of Gas Engineers, at the Savoy Hotel, on November 28, 1950, Mr. **F. M. Birks,** C.B.E., the President, said that in the future, as research became more complex and relied yet more on teams of highly trained specialists, the education of engineers and others in the industry must attain a correspondingly high level.

Left to right: Sir Donald Fergusson, Dame Vera Laughton Matthews, Sir Griffith Williams, Colonel H. C. Smith, Sir Harold Brown.

Mr. Birks made the foregoing comment in proposing the toast of the guests. One function of the engineer, he continued, was to form a link between the scientific work of the research people and the actual putting into operation by the workpeople. No new idea ever became of practical use until it was thoroughly understood and appreciated by the rank and file of the industry. Their proceedings at the Institution and their luncheon would, he submitted, form a valuable opportunity to those in the industry who were vitally interested in these matters of getting together and appreciating not only the work that was being done, but the people who were doing it. They particularly welcomed Sir Edgar Sylvester, the Chairman of the Gas Council, and Colonel Harold Smith, the Deputy Chairman, and the many chairmen of area boards who were with them that day. Here he would say something quite personal. Before May 1, 1949, he would by tradition have invited to that luncheon the Governor of the Gas Light and Coke Company, Mr. Michael Milne-Watson. That day he had the unique privilege of bringing him as his personal guest, and still as his Chairman. They were also honoured to have with them the Presidents and other representatives of many kindred bodies, among them the President of the Institution of Mechanical Engineers, Dr. S. F. Dorey, to whom they were grateful for permission to use his Institution's meeting hall. He added how much they appreciated the presence of representatives of Government departments and particularly of the Ministry of Fuel and Power. And the Institution always rejoiced in the company of representatives of the gas industry overseas. He cordially greeted M. Touwaide, Secretary of the International Gas Union and of the Association of Belgian Gas Engineers, and M. Agron, official representative of Gaz de France.

Professor **Lillian Penson,** PH.D., LL.D., D.LITT., Vice-Chancellor, University of London, responding to the toast, said she realised that she was responding for a number of distinguished guests besides the Chairman of the Gas Council, and it was quite impossible to refer to all of them. She would, however, like to refer to Dame Vera Laughton Mathews and to Sir Griffith Williams. At the University of London they were much impressed with the importance of the work that was being done in research and education in connection with the particular problems in which gas engineers were concerned. There had been a great deal of discussion lately in the Press and in conferences and in all sorts of places about the distribution of research as between the universities and the various industries. She would not like to try to delineate those distinctions, but she was convinced that in this country they were going to carry forward into the future that great tradition for research, invention, and imagination and progress which they had inherited from their forefathers. The closest co-operation would be required between research activities in the universities and in industry.

Dr. **S. F. Dorey,** C.B.E., President of the Institution of Mechanical Engineers, proposed the toast of the Institution of Gas Engineers. He was not, he confessed, altogether familiar with the work of the Institution, but in reading through its history he found that although in one form it was founded in 1863 it was not without interest to note that under its present constitution it was really due to celebrate its Diamond Jubilee this year as the Institution of Gas Engineers. He therefore felt he was in order in his capacity as President in expressing the best wishes of the Council and members of the Institution of Mechanical Engineers for the continued successful progress of the Institution on the sound basis on which it had worked and prospered for so many years. It was also particularly pleasing to note the measures taken since the grant of the Royal Charter in 1929 to enhance the status of the Institution by steadily increasing the standards of examination for the various grades of membership. He was certain that the upgrading of those standards was beneficial not only to the Institution itself but to the industries with which it was associated and the community whom its members served.

Mr. **J. H. Dyde,** Senior Vice-President, responding to the toast, expressed a keen sense of satisfaction at the kind references which Dr. Dorey had made to the Institution. Continuing, Mr. Dyde said that the gas industry must resort to every mechanical device it could. He knew from his own experience that engineers had with increasing frequency been placing before their directors, and latterly before their area boards, schemes for the mechanical handling of materials and the general mechanisation of process work, with attractive, or seemingly attractive, estimates of the saving in labour and general working costs that would follow. The fact that in many cases such savings had not been fully achieved was not, to his mind, the crucial point. It was evident that in industry it was essential to make work as attractive as possible in order to secure the labour that was required. This was the Institution's research meeting, and his hearers would expect him to say at least a word about research. They recognised, of course, that the Gas Act placed fairly and squarely on the shoulders of the Gas Council the responsibility for initiating, controlling, and financing research in the industry. They were proud, however, that the Institution took the initiative in research in the industry, and in the latter years, by collaboration with the Society of British Gas Industries, set up the Gas Research Board. They knew now that the Gas Council, with its vast resources and control of the unified supply industry, could undertake research on a scale, and with an assurance, which was not previously possible. They were most gratified that the new Research Committee set up by the Gas Council included such eminent scientists as Sir Robert Robinson and Sir Cyril Hinshelwood, and that it should number among its members the President for the time being of the Institution of Gas Engineers, and also the Livesey Professor of the Department of Coal Gas and Fuel Industries of the University of Leeds, with whom they had been associated so long on the subject of research.

The papers at this year's research meeting were of great diversity, from latest developments in constructional method to the implication and application of combustion research to utilisation, and finally to the catalytic gasification of petroleum oil in the production of town gas. Having regard to the present difficulties of supplying sufficient coal, particularly of a description to meet the growing needs of their own industry, the gasification of heavy petro-

leum oil from the large new refineries now being erected might well prove to be of immediate and immense significance. The results from the pilot plant were certainly most encouraging. In this connection there had been a rapid and most commendable bridging of the gap that had so frequently been the difficulty in translating the results of the laboratory bench to the pilot stage, and on to the commercial unit. In the bridging of the gap the real value lay in applying the fundamental work of the scientist to practical application and realisation.

Mr. **Michael Milne-Watson,** Chairman of the North Thames Gas Board, briefly proposed the toast of the President. He had known Mr. Birks for a very long time, and he hoped they might long continue to work together. Happily their relationship had not been impaired by nationalisation. Mr. Birks had been to him a guide, philosopher, and friend. He had an international reputation and international experience as an engineer, not only in this country, but in the Argentine, Brazil, and Wales, and he was confident that the Institution was in for a good year.

The President briefly responded.

The Weekly Statistical Statement by the Ministry of Fuel and Power gives the following figures for total gas available at gasworks: November 12, 11,540.4 mill. cu.ft.; November 19, 11,843.5 mill. cu.ft. The last figure compares with 11,251.9 mill. cu.ft. for the same week a year ago. The aggregate for the 46 weeks of the current year at 466,614.6 cu.ft. compares with 448,477.7 cu.ft. for the same period of 1949.

The Evolution of the Gas Cooker, illustrated by lantern slides, was a subject of the recent talk given by Mr. A. Forshaw, M.Sc., Chief Chemist, R. & A. Main, Ltd., to the distribution and fitting staffs of the Lincoln sub-division of the East Midlands Gas Board.

In Recognition of 55 Years' Service

A PARTY of 15, representing the works, staff, and directors, presented a silver cigar box, suitably engraved, to Mr. G. Neville Sperryn, Chairman and Managing Director of Sperryn & Co., on November 22, to mark their appreciation of his completion of 55 years' service to the company.

Long service has always been a noteworthy feature of the history of the company, as witnessed by the small assembled party, whose combined service, including the 55 years of the Chairman, totalled 600 years, an average of nearly 38 years.

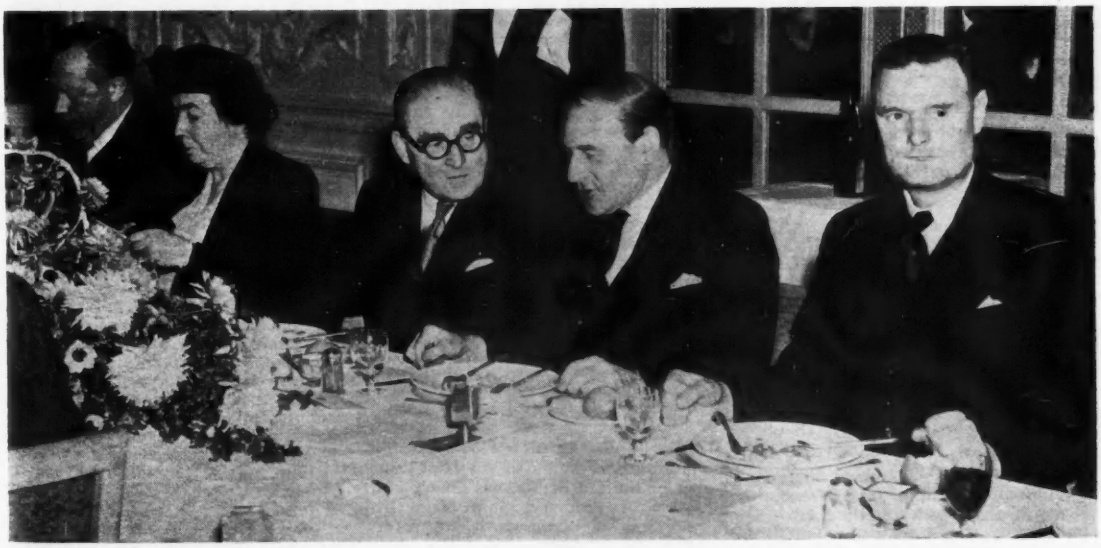
Mr. Sperryn joined his father, the founder of the company, in 1895, some six years after the firm's foundation. At that time there were about 50 employees. Two years later he was joined by his brother, Mr. W. J. G. Sperryn, and with his assistance the firm developed steadily and he piloted it through the difficult years of the 1914-18 war and the world slump between the two wars. Today the whole organisation embraces over 1,000 employees. Mr. G. N. Sperryn was appointed Managing Director in 1927 and became Chairman in 1929.

Export trade has played an important part in the history of the company, to which Mr. Sperryn has made a major contribution. In his early days he made frequent trips to the Continent, where he obtained vast orders for gas lighting fittings. Since those days he has travelled the world in search of markets. In July of this year he returned from a trip to Canada and the U.S.A., thus completing a third visit to the North American Continent. He has also toured India and South America, and early in January he leaves for his third trip to New Zealand and Australia.

It was with particular pleasure that the party welcomed Mrs. Sperryn on this occasion and they were wished a happy and successful trip.

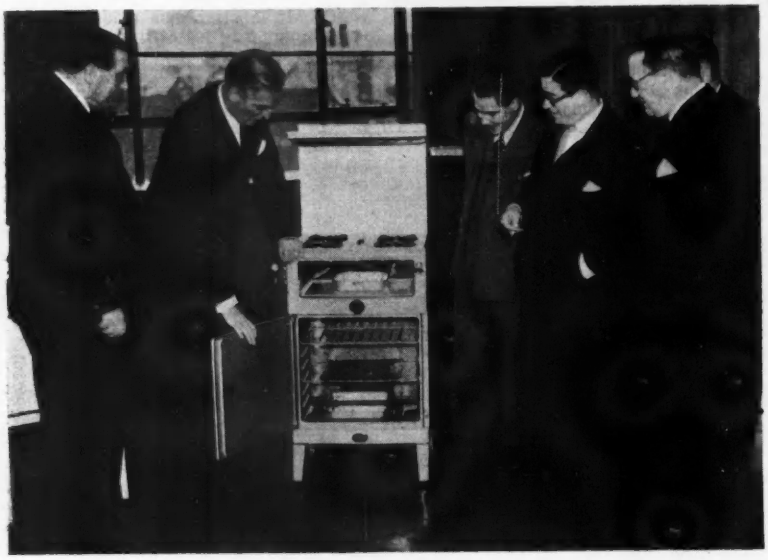
Apart from his work for the company Mr. Sperryn is a member of the Birmingham Assessment Committee; past-president, Birmingham Chamber of Commerce (1946-47), and member of Council; chairman, B.I.F. (Castle Bromwich) Management Committee; member of the Price Regulation Committee (Board of Trade), Ministry of Labour and National Service Committee; served on several B.S.I. Committees on Standardisation; Associate of the Institution of Gas Engineers; and member of the Warwickshire County Council.

Left to right: Mrs. G. N. Sperryn, Mr. G. N. Sperryn, Mr. W. J. G. Sperryn, Mr. A. A. Brocklin, Mr. Holland (employee), Mr. G. R. N. Sperryn, and Mr. J. G. Sperryn.



The Research Luncheon. Left to right: Sir Edgar Sylvester, Professor Lillian Penson, Mr. F. M. Birks, Dr. S. F. Dorey and Mr. J. H. Dyde.

Mr. Anthony Eden Visits Flavel's



Mr. Anthony Eden inspected the new Flavel '68' gas cooker on which the company is now concentrating. From left to right—Mr. W. Arnold Jackson (Chairman and Managing Director); Mr. Anthony Eden; Mr. J. Allen (Works Director); Mr. F. M. Rogers (Sales Director); Mr. Duncan Wright (Assistant Managing Director); and Mr. J. Simms (Director).

THE Right Hon. Anthony Eden (M.P. for the Warwick and Leamington Spa Division) recently paid a visit to the Works of Messrs. Sidney Flavel and Co., Ltd., Eagle Foundry, Leamington Spa, where he was welcomed by the Chairman and Managing Director (Mr. W. Arnold Jackson) and other members of the board.

During his tour of the Works, Mr. Eden was introduced to leading personnel, both on the executive and works staff, and congratulated all concerned not only on the wide variety of new machinery and equipment but also on the large amount of products being turned out. Mr. Eden remarked that although he saw that the Company had devoted a considerable part of their factory to the re-armament programme, he sincerely hoped that the products from this particular section would not have to be used, other than in the rôle of necessary preparedness. He stated that he well remembered Mr. W. Arnold Jackson's call upon him in the early days of the war, when he suggested that certain of the firm's plant could then be used for armament production. Mr. Eden, at that time, put the Chairman into touch with the Ministry of Supply, and the outcome was an immediate contract for the supply of war equipment upon which the Company was engaged from 1940 to 1945.

Mr. Eden was particularly impressed with the details given to him concerning the great Exhibition of 1851, in which Messrs. Sidney Flavel were presented with one of nineteen Gold Medals (out of a total of some 17,000 exhibitors) for a cooking appliance, of which it was said that 'by no other contrivance can the fire of one grate be made so immediately subservient to the cook's views . . . that servants cannot easily disorder or mismanage it, and perfect cleanliness attending, it cannot fail to be approved by the mistress of the establishment.'

DENTON HOMECRAFT COMPETITION

More than 260 varied exhibits were entered by 100 exhibitors in a homecraft competition organised at Denton by the North Cheshire Group of the North Western Gas Board.

Prizes were presented by Councillor Mrs. Casey, Mayor of Glossop, who said she believed that everybody should be able to choose their own method of cooking when choosing a new house.

Mr. John Grayston, G.M., General Manager of the North Cheshire Group of undertakings, said that although the gas board represented a much wider field than previously none of the local facilities or interests had been changed.

Production of Gas at the Chudleigh gasworks is to end within the next few months, it is stated, but there is no intention of dismantling the works, which will continue to operate on bulk supplies from Newton Abbot. The site of the Chudleigh works has been used for gas making for about a century, the original works being rebuilt in 1904.

Bravery Rewarded. — Mr. Harold Ronning, plater's mate at the Nine Elms works of the North Thames Gas Board, pulled a 7½ year old child off a live railway line at Wandsworth just before a train came along. He has been awarded a Carnegie Hero Fund Certificate for this brave deed.

Gas for Large Scale Cooking

The trend of modern life is increasingly making it both necessary and desirable for many people to have their meals outside the home. It has been estimated that between 1943 and 1948 the percentage of meals eaten outside the home in this country had more than doubled. In hotels and restaurants, staff and factory canteens, schools and hospitals, the need for large scale catering equipment which will be efficient and economical, clean and easy to run, is becoming increasingly felt. The gas industry is constantly planning and testing new appliances which will meet the needs of canteen supervisors and restaurant managers, and in *Gas for Large-scale Cooking* (Gas Council, 1, Grosvenor Place, S.W.1, price 1s. 3d.) are illustrated the latest models available—models which both in performance and appearance will meet the most exacting demands.

The illustrations in this booklet range from the kitchens of world famous buildings such as the Royal Albert Hall, the Shakespeare Memorial Theatre, and the White City Stadium, luxurious hotels such as the Park Lane and Piccadilly or the Grand at Brighton and clubs such as the Royal Automobile Club, London, to restaurants, canteens, and school kitchens in all parts of the country. Information is given of the appliances needed for kitchens of various sizes and of the number of meals which can be served from them.

There are now nearly 100,000 catering establishments of various kinds in the country, and this booklet, with its information about the contribution which the gas industry is making in providing efficient kitchen installations, should be of the greatest interest to them all.

Oil Refineries Visited

Forty members attended a full day meeting of the Wales & Monmouthshire Junior Gas Association, which comprised a tour of the industrial area adjacent to Swansea, on November 14. They commenced their itinerary by visiting the site of the new bridge operation at Briton Ferry, considered a major feat of engineering, and later in the day went on to the National Oil Refineries at Llandarcy. After making a survey of the refineries they saw a film on oil distillation and also heard a brief explanation on the prevention of petroleum fires.

At a luncheon in Neath (Mr. C. L. Singleton, Chepstow, President of the Association, in the chair), Mr. Stanley Armitage (Parkinson & Cowan, Ltd., Bristol) proposed a vote of thanks to the Neath undertaking, who were hosts. He also extended a word of appreciation for the help given by the consulting engineers at the bridge site. He was seconded by Mr. I. Jenkins (R. & A. Main, Ltd.).

Mr. G. Fitton (Engineer and Manager, Neath undertaking) welcomed the Association and was seconded by Mr. J. H. Amos on behalf of the consulting engineers.

Alderman J. Emmanuel (part-time Member of the Wales Gas Board) and Major W. F. Bryan (Welfare Officer of N.O.R.) also spoke.

THE *JOURNAL* REVIEWS

New Films for the Industry

A PRIVATE preview at the Curzon Cinema, London, on November 30, introduced two new additions to the Gas Council's expanding library of educational, propaganda, and documentary films, which now total 50 and reach an audience of more than two million annually.

For some 16 years the gas industry has been slowly developing the use of films as an integral part of their publicity, and every year some 7,000 films are issued on loan from the Gas Council library, in addition to which area gas boards employ several hundred copies for inclusion in their regular programmes to local audiences.

Mr. R. J. Gregg, Publicity Manager to the Gas Council, is of the opinion that these figures could and should be raised to a circulation of 20,000 films a year to an audience of five million. This project, however, cannot be achieved without the wholehearted co-operation of the industry coupled with a realisation of the 'golden investment' (we quote Mr. Gregg) it represents. We have yet to take full advantage of an immense potential adult audience who are definitely interested in gas films as distinct from the requirements of the habitual filmgoer, while the younger generation, too, are eager for this form of educational instruction. The latter are, be it never forgotten, the future owners of the gas industry and, perhaps even more important, its future consumers. For this reason, films for the youngsters play a big part in the Gas Council's programme. There are 50,000 schools of one kind or another in this country—so there is a tremendous field to cover.

In commenting briefly on the new films we believe we start off with some advantage in not being professional film critics. We know less than nothing about film production and technique, and we shall therefore not be expected to do otherwise than skate discreetly past these pitfalls and concentrate more or less objectively on how the films struck us as average, though by no means excessive, filmgoers.

The first one—a technicolour cartoon—is in two parts. It is, we consider, sometimes dangerous to ascribe anything—be it book, film, or hobby—as appropriate to a fixed age group as this film is to children from eight to 12. After all, who does not enjoy technicolour cartoons? Personally, we travel miles to see them, and one is apt to resent the inference that one's mental age is eight. We would unhesitatingly label most such films as suitable for all children from eight to 80. As, however, this particular film is intended almost exclusively for schools the qualification is perhaps justified.

The first part—'Long, Long Ago'—depicts a family of ichthyosaurus—or would it be dinosaur?—besporting themselves in primeval swamp and jungle, while overhead a couple of pterodactyl engage in a squabble which apparently ends in their eating each other. The underlying theme is, of course, the origin of our coal; but while we do get a glimpse of the ice-age we feel a little more could have been made of the submergence of the forests and their gradual metamorphosis into coal seams. Just a shade too long drawn out, this first part. The antics of the prehistoric monsters, while undeniably amusing, tend to overcamouflage the basic idea. Some of them could well have been replaced by some kind of diagrammatic representation of the formation of the coal fields. The opening and closing shots are excellent and struck quite the right note, concluding with our lump of coal off on his way to the gasworks.

Part II—'And Now Today'—follows the life of our piece of coal to the carbonising chamber and his emergence transformed into gas, tar, ammonia, and sulphur. One cannot avoid a feeling of regret that the figure portraying gas is not the familiar Mr. Therm we know and love. We understand, however, that in a film dedicated to education the faintest breath of advertising is strictly taboo. So, alas! in this instance a peculiar little figure half-way between a teddybear and an eskimo skips and dances his way through miles of mains, shedding his by-products in the shape of other strange little people as he goes through the various purifying processes. Nevertheless, this part of the film is well conceived and gets over the story of gas manufacture in a vivid and easily-comprehended way.

The other film—'Method and Madness'—stars Richard Hearne and contrives admirably to combine laughter with learning in its treatment of one of the housewife's least popular burdens—the family washday. Richard Hearne, in the part of 'Mr. Pastry,' rashly undertakes to introduce method into his wife's weekly washday while the latter goes out and, quite fortuitously, passes the gas showrooms where by another extraordinary coincidence a demonstration of home laundry is actually in progress. Needless to say she goes in—and from that point we are regaled with alternate shots of Mrs. Pastry seeing how it should be done with the help of gas and Mr. Pastry, with a well-meaning but singularly futile neighbour, getting more and more involved with the wash at home. Real good old-fashioned slapstick comedy—culminating, of course, in complete and utter chaos. Into this comes Mrs. Pastry, returned from the demonstration, and takes the opportunity of putting in some useful propaganda work on her husband. The result? Well, there are evidently no half-measures about Mr. Pastry. Not merely a gas washboiler for him. He goes the whole hog—and the resulting all-gas kitchen, as depicted in the final shot, must have set him back more than a few pounds.

This film contrast sheer lunacy with the smooth running of a gas washday—combining instruction with light relief. Again perhaps a trifle long (at 29 minutes) for a propaganda film, but nevertheless one which should make a wide appeal and serve a valuable purpose.

Gas Films and Publicity

THE General Purposes Committee of the South Eastern Consultative Council at a meeting on November 7, under the Chairmanship of Alderman A. C. Warwick, J.P., approved a proposal that gas films exhibited to the public might include some reference to Consultative Councils' activities and that an approach be made to the B.B.C. for a talk on the gas industry. Both these matters had been referred to the South Eastern Gas Board for consideration.

With a view to publicity, a recommendation for the issue of leaflets for distribution via the S.E. Gas Board's Showrooms, was given further consideration.

One resignation from the Council (Sir C. V. Jones, C.B.E.) was reported, and two additional members were appointed—namely, Mrs. C. A. Walsh (National Union of Townswomen's Guilds) and Councillor T. K. Dobson (Surrey County Council) to the Metropolitan and West Surrey District Committees, respectively.

It was decided that press statements might be issued on proceedings at District Committee Meetings, if considered necessary.

Items of correspondence included complaints which had been referred to the Board for attention, and an inquiry from a local branch of a Women's organisation, for information relating to the Council's functions. It was arranged that a representative of the Council should attend a meeting of the branch concerned.

Medical Officer Talks to London and Southern Juniors

THE meeting of the London and Southern Junior Gas Association, held in the lecture theatre of the North Thames Gas Board's Edgware Road showrooms on November 10, was marked by a most entertaining and instructive talk by Dr. H. S. Crichton Starkey (Consulting Medical Officer to the North Thames Gas Board). The President, Mr. T. V. Garrud, was in the chair and commented that this was the first time the Association had ever been addressed by a medical officer.

Dr. **Starkey** said that medicine was roughly divided into two main sections curative and preventive—the more important of which was preventive. An enormous amount of research had been carried out, and there were now several diseases which had practically been wiped out and many others which were far less serious than they used to be.

From the earliest times life had never been easy for man; but primitive man's life was so circumscribed that his whole experience was confined to what he actually saw and touched—and he had nothing but his own personal experience to guide him. Today it was exactly the reverse. What we suffered from now was that our existence had been so widened that countless different influences impinged on our lives. Dr. Starkey no longer looked on a patient as just an isolated person; he had to take into consideration his wife, his home, his working conditions, and his whole environment. A high sickness rate in a certain department compared with others in the same business was often directly due to the temperament of the foreman or manager of that department. The latter made things difficult or unpleasant for the workers, and at the least excuse they stayed away as long as they could. Or perhaps a man had a son in the Services, and he was worried about the possibility of his being drafted to the Far East. It was this background of worry that affected health.

A Complex World

In this very complex world how could we sort things out so as to get a sane mind in a healthy body? We must try, said the doctor, to get back to some simple groundwork to give us a chance of sorting out the facts in their true perspective. Could we think of any way to simplify things so as to get a clear picture of what is going on? One of the best examples lay in history. It had been said that history was governed by geography—and if we paused to think about it this was perfectly true. If we took a contour map and studied it we could have foreseen much of the world's history. Look at our own country, for instance. We saw an island with a number of slow rivers; and we should have said that this would breed a seafaring race which would found colonies; our principal enemies would have been other seafaring powers, as history had proved in the Spaniards, the Dutch, and the French. Dr. Starkey referred to the inscription in Delphi: 'Man, Know Thyself,' and said that if we knew ourselves inside out we should not be biassed.

Just as it was impossible for two people to have the same finger prints, so was it impossible for there ever to be two people exactly alike. Therefore, if we were each of us unique it stood to reason that the race would get on better the more individually we were treated. In business life one of the reasons the one-man firm did well was the individuality of the owner. At the back of our minds there should always be the idea that everyone should have his individual liberty and individual expression. To treat everyone the same and try to mould them into similarity was not the best way to get things done. To make people similar one had to lower the standard.

Dr. Starkey compared our bodies with the industry's production works. We had to put in a certain amount of energy in the shape of food, and we got out a certain amount of by-products. With regard to the raw material fed in, one was constantly being told of people's ideas about what our food should be. As a general guide in this matter we should look at our teeth, which were mid-way between those of the carnivora and the herbivora. It was therefore silly to say that we should all be vegetarians any more than that we should subsist entirely on meat. We should largely be guided by our own instincts. On the question of quantity, the British were quite mad. When it was hot and we were not required to work very hard we ate large quantities of meat; yet we should never dream of trying to run our cars on a very rich mixture. Our diet should depend on our mode of existence. Many of the greatest works of genius, he added, were perpetrated when the author was on the verge of starvation. The brain itself needed very little food.

The reason man did not live for ever was because every living thing sooner or later killed itself by the products of its own existence. As the years went by the organs suffered from the effects of their natural function of perpetually passing poisonous matter.

If we took more food than we needed we used up more energy than necessary to assimilate it. To use our food to the best advantage we must not be influenced by what other people said we ought or ought not to eat. We should regulate our intake according to the amount of work we were going to do; if we were going to do heavy work then we needed more proteins and energy-producing food.

A lot of nonsense was talked about pain, said Dr. Starkey. Pain was essential because it was the only thing which gave us any warning that something was wrong; it was a protective mechanism and was only evil when we were unable to get rid of the cause of it.

One of the greatest problems of the day was this wave of enthusiasm for psychology. Dr. Starkey did not like the word as applied to specific people. We were all psychologists and instinctively employed psychological processes throughout our lives. The baby howled because his instinctive psychology told him that by so doing he would be picked up and comforted. The business man knew psychologically that it sometimes paid to bully and sometimes to flatter. Yet people visited psychologists whose job was to produce a soothing atmosphere in which the 'patient' did nothing more than what used to be called 'getting it off his chest,' but was now technically referred to as 'abreaction.' There was nothing new in this kind of treatment. Dr. Starkey suggested that if we found ourselves getting into a mess, losing our concentration, the first thing was to stop making statements and start asking ourselves questions. If we thought someone had let us down or done something we strongly disapproved of, it was no use swearing about him and calling him a cad. After all, a cad was merely someone who was doing something we had not the guts or the opportunity to do ourselves. We must get down to rock bottom and cross-examine ourselves on just what it was all about.

We should base our daily lives on our traditional proverbs and sayings, which were the quintessence of racial wisdom. In almost every circumstance there was an applicable proverb which gave us an excellent guide to our best procedure. And our principal motto should be 'Live and Let Live.'

Discussion

Mr. **T. V. Garrud** (the President), in opening the discussion, said he very much liked Dr. Starkey's philosophy, which was a tonic to all of them. As regards our food, there was a lot of truth in the saying that food should be fun, not fuel.

Mr. **W. Johnson** (South Eastern) said this was a subject which was of great importance to them all, particularly the effect of health on our daily work. It was not the efficiency of the plant or the efficiency of the system which made an undertaking a good one or a bad one. It was the ability of the staff to work together. Although Dr. Starkey had appeared somewhat antagonistic to the practical psychologist, this was nevertheless the latest fashion in staff recruitment. He had personally never seen the reason for asking a lot of irrelevant questions to assess the value of a

recruit. To what extent could the medical profession help them in the selection of staff? There seemed to be a great deal of luck in the choice.

Dr. **Starkey** said that this was a very difficult matter. Psychologists had been selling the idea to industry for many years. Very often the 'smart alec' showed up well in a psychology test but turned out to be quite unsatisfactory afterwards, whereas those who seemed dull in the test were frequently good, steady workers. The only certain test of suitability was the probationary period.

Too Much Drinking

Questioned by another member on the growing habit of drinking large quantities of liquid every day, the doctor said that we drank far too much tea and coffee, both of which contained stimulants, particularly coffee. Sooner or later our kidneys would rebel at this continued tippling of mild drugs. On the other hand, it was not possible to drink too much water. Answering a question on the subject of blood pressure, Dr. Starkey explained that our blood vessels were normally elastic and buffered the force of the heart beats. As we grew older the vessels became harder and tended to lose their buffering effect until eventually they might reach bursting point. If the resulting hæmorrhage occurred in the brain or somewhere else where the blood could not clot one had a stroke or cerebral hæmorrhage. All one could do was to lead a quiet, steady life. Asked whether the value one got from one's food was in proportion to the enjoyment one got out of eating it, the doctor replied in the affirmative—adding that this was proved by the fact that our salivary and gastric juices began to function in anticipation of a forthcoming meal or when we smelt attractive cooking odours.

Mr. **E. W. B. Dunning** (North Thames) observed that many of our proverbs contradicted one another. He enquired whether the common cold was similar to malaria inasmuch as the same germ kept coming to the surface again after a period of quiescence.

Dr. **Starkey** said that where two proverbs seemed to conflict we should choose that which suited us best. Malaria was not like the common cold; it was caused by an organism which had two life cycles—one in the mosquito and the other in the human being. Incidentally, no one was ever sorry for the mosquito, which had a perfectly rotten time. The organism caused an enormous cyst in the insect's stomach. In the human being, this organism lay latent for some time and then found its way into the bloodstream and caused a recurrence of the disease which, however, tended to get less severe as time went on. Milk provided some safeguard against the common cold, and the fact that children today drank a good deal of milk was why they were often less susceptible to colds than adults.

It was suggested by one speaker that a certain amount of worry was a good thing and stimulated people to do a better job. Many people enjoyed worrying. Dr. Starkey observed that if anyone liked worrying he would hate to deprive him of this enjoyment. Questioned on the use of the sulphur group of drugs, the doctor said that the original ones were very toxic, but they were being improved. They were a kind of shock tactics. One took large doses for a limited period—and if they had not then done any good they must be dropped altogether.

Mr. **J. Bain** (South Eastern) observed that in many cases it seemed that the doctor should treat the foreman rather than the worker, to which Dr. Starkey replied that, where appropriate, he sometimes did make certain suggestions to the management in this respect. Leadership was outside medicine. A good worker would not necessarily make a good foreman for the reason that he did not possess the attributes of leadership. The trouble-maker in the works often only behaved as he did because he had this instinct of individuality and leadership. It was exceedingly difficult to promote the trouble-maker, although he might well be an excellent foreman because of his aptitude for leadership.

In reply to a question on whether our present-day food gave rise to digestive troubles and whether worry was not connected with conscientiousness, Dr. Starkey said there was no doubt that our food was not up to the old standard and was to some extent to blame; but worry frequently resulted in gastric disorders. Our digestive system should be entirely automatic, but if we were worried it did not function properly. Conscientiousness was much the same thing as conscience, and many people would be far happier if they could have their consciences removed by surgical operation. Conscientiousness was what often made a job difficult, and it was this business of never letting a thing alone which destroyed the peace of mind of everyone working on it.

Asked whether he favoured the abolition of the examination system, Dr. Starkey said that many people, like himself, had an aptitude for examinations. It was difficult to see how we could do without them. Some examination questions, however, were ridiculously difficult and defeated the whole object of the system. An examination designed merely to find out what the candidate knew was good.

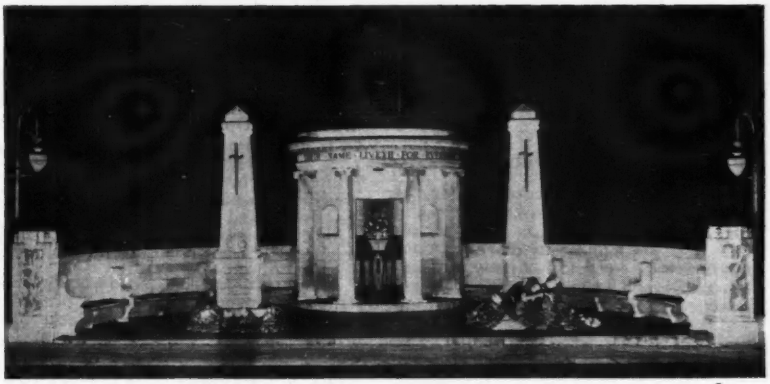
Dr. **A. E. Haffner** (North Thames) proposed a vote of thanks to Dr. Starkey, which was warmly accorded.

A Social Club for Durham City gasworkers and their wives and friends was opened at Durham on November 17 by Mr. W. O. Kirkwood, General Manager of the Sunderland Division, Northern Gas Board. The premises were decorated by workers and their wives in their spare time. Guests were welcomed by Mr. J. C. Morley, Manager of the Durham office, and Mrs. Kirkwood was presented with a bouquet by Miss Dorothy Horn. The Secretary of the new club is Mr. W. Parker.

The Year Book of the Heating and Ventilating Industry is the fourth of its kind to be issued in collaboration with the Association of Heating, Ventilating and Domestic Engineering Employers (58, Victoria Street, S.W.1). Its purpose is to provide in one compact volume the greatest possible amount of technical, contractual, and other trade information for the benefit of architects, consulting engineers, surveyors, and others who are continually in close contact with heating and ventilating contractors.

FLOODLIGHTING OF WAR MEMORIAL

BEDFORD was honoured by Her Majesty the Queen on November 11, when she graciously unveiled and dedicated the war memorial obelisk, at Kempston Barracks, to the members of the Bedfordshire and Hertfordshire Regiment who died in the second world war. Among those presented to Her Majesty was Alderman Richard Turner, J.P., Mayor of Bedford and Chairman of the Eastern Gas Consultative Council. By night gas floodlighting revealed the beauty and dignity of the memorial. In a letter received by the Bedford District of the Cambridge Division, the thanks of Lieutenant-General Sir Reginald Denning, K.B.E., C.B., and the Regiment were expressed to the Bedford staff for the beautiful effect of the floodlighting, which Her Majesty the Queen was able to see and admire before her departure.



The gas floodlighting was carried out by means of nine 8-light No. 1 Edgar Vertiflood lamps, and two Foster Fulham 10-light No. 2 lamps.

The N.C.B. Coke Plant at Nantgarw

Visited by Wales and Monmouthshire Juniors

THE opening meeting of the Wales and Monmouthshire Junior Gas Association was held at the Treforest Trading Estate on October 19. The President, Mr. P. G. Wride, introduced the President-elect, Mr. C. L. Singleton, Chepstow, who was duly elected as President for the ensuing year. The new President presented a silver salver and Presidential Certificate to the retiring President, referring to the excellent work which Mr. Wride had put in on behalf of the Association. Mr. Wride responded and thanked members for their support.

The meeting took the form of a visit to the coke oven and by-product plant now under construction for the N.C.B. at Nantgarw.

The carbonising plant consists of an installation of Simon-Carves under-jet compound ovens, built in four batteries of 12 ovens per battery. Ultimately, the plant will be extended to six batteries. The ovens will be fired by coal gas, or producer gas made in mechanical producers burning coke nuts. The works will be complete with coal crushing and blending plant with overhead belt conveyors conveying the coal to the storage bunkers and belt conveyors to carry the quenched coke to the grading plant. The breeze below ½ in. will be used to fire the breeze burning boilers, of which there are three, each having a capacity of 30,000 lb./hr. at 250 lb. pressure. Benzole will be extracted before the oxide purifiers. The plant when completed will carbonise 1,500 tons per day and it is intended that it shall utilise the coal from Nantgarw Colliery which is to be mined by horizon mining. As this coal will not be available when the plant is ready to start, other local coals will be used in the first instance.

The parties were conducted around the works by Mr. Barrett, Divisional Carbonisation Officer, South Western Division, N.C.B., Mr. Alun West, Deputy Divisional Carbonisation Officer, Manager, Bargood Coke Ovens, and Mr. Childs, Manager, Coed-ely Coke Ovens. After the tour tea was provided by the courtesy of the Rhymney and Aber undertaking, and this was followed by an informal discussion.

Of Twofold Interest

In opening the discussion, Mr. **H. Buckley** (Pontypool) thanked the N.C.B. for granting facilities for the visit and said that his interest in the afternoon's meeting was twofold. Firstly, because he had been associated with the construction of the new works at Pontypool and, secondly, he had spent some short time on a coke oven installation. He was surprised that coke oven engineers did not go in more for the dry cooling of their coke. He estimated that the heat in the coke leaving the ovens at a temperature of 900° C. on an installation carbonising 1,000 tons per day was sufficient to produce approximately 26,000 lb. of steam per hour, which he estimated would be sufficient to run a 700/750 kW turbo-alternator. He appreciated that the steam curve would have peaks due to the intermittent discharging of the ovens, but this could be overcome by the use of accumulators.

Mr. Buckley then spoke of his experience in lighting up a coke oven installation. Small wooden fires were first started in the ovens. These were then built into coal fires on grates and temperatures were brought up to about 700° C., using coal and ultimately coke. At this point, the gas from another battery of ovens was turned on to the battery being heated up. He understood that, where gas was available, it was usual to heat the ovens up using gas, but he wondered how they were going to work in this instance where they had had no gas available. He asked what was the advantage of top charging as against cake charging and he said he understood that welded mains were to be used on the works and wondered whether they had considered the possibility of failure on each side of the welds where ammonia was present in the gas. He also asked what instruments it was intended to install on the works.

Mr. **Barrett** replied that, regarding welded mains, coke oven practice was simple. On the suction side the gas main was rivetted and on the pressure side welded. He felt that any trouble which arose would not be caused by the welds but by the type of rod used by the welder, and no trouble would be experienced with the correct materials. In regard to the dry cooling of coke, dry cooled coke was lighter than coke which had been quenched and air dried. In addition, dry cooling gave an intermittent load and, if there was a hold-up with the discharging car, then there would be a shortage of steam, which meant that the exhauster had to be run on a standby supply of steam. This, in turn, meant that extra boiler plant was needed as standby. Dry cooling plant was very expensive and it was necessary to have standby boilers on low steam in case the cooling plant misbehaved. Heating up was fairly easy either with gas or with coal. On heating up there would be 7 in. expansion to take up laterally. They would get the temperatures up to 700° C. by heating with coal in the ovens and would then charge one of the ovens and 'chase' the gas made through the system and to the oven feed points.

Automatic controls were being installed throughout as far as possible. The ovens would be in four blocks following gasworks practice to enable a section to be shut down for repairs, which it was hoped would be possible in the summer period. There would be double collecting mains and Askania controls controlling the main pressure and the exhausters. The exhauster controls would be interlinked with the control on the oven so as to avoid 'fighting.'

The water to the primary condensers would be controlled thermostatically to keep it at 25° C. On the steam side the back pressure steam from the exhausters would be used to run the heating system of the colliery. The benzole and ammonia plants would be completely automatic. On the distribution side, the compressor would be electrically driven with two small standby steam driven machines. Volumetric control would be used. They would use top charging, though some engineers still favoured cake charging, which was used to increase the bulk density of the coal to give denser coke.

Mr. **A. H. Dyer** (Newport) said he understood that temporarily a highly swelling coal would be used. What precautions would be taken in the use of that coal to avoid trouble? He also asked what type of meter would be used to measure the gas.

Mr. **Alun West** said that using certain coals alone would be highly dangerous, and the way they proposed to overcome the swelling coal was to mix all these coals. Most swelling coals could be made reasonably safe by judicious blending. The gas would be measured by a Connersville meter having a capacity of 18 mill. cu.ft. per day.

Naphthalene Content

Mr. **S. L. Wright** (Gas Engineer, Wales Gas Board) said he would like to have more information about the by-products, and asked how it was proposed to deal with the naphthalene from the coke oven plant.

Mr. **Barrett** stated it was a question of cooling. After-coolers were being installed on the compressors and washing for naphthalene would be done by gas oil. They proposed to reduce the naphthalene content of the gas to ¼ grain in winter and 1½ grains in summer.

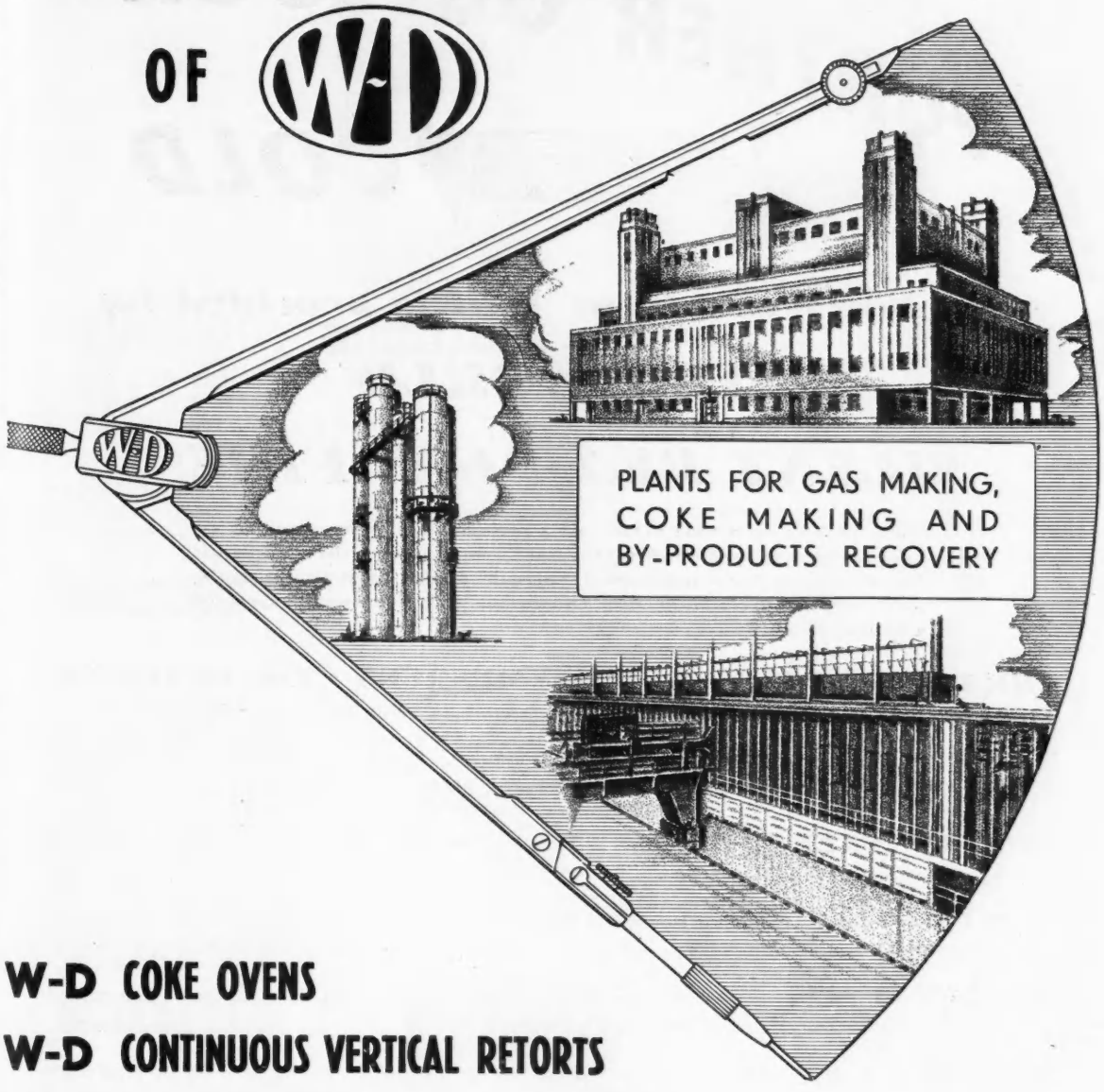
Mr. **S. G. Meade** (Newport) asked what would be the source of the water supply. Did they intend to use town water or had wells been sunk?

Mr. **Barrett** answered that there would be available approximately 10,000 gall./hr. pit water, which, at the moment, was reasonably clean and safe. However, as the pit water was apt to change in character they were taking a further supply from the river and had installed two borehole pumps having a capacity of 75,000 gall./hr. feeding through 12 in. pipe to a 100,000 gal. storage tank on top of the bunker. This gave a dirty water system. The town water supply, in case the pit water became hard, came along the main road and into the works that way.

Mr. **Ricketts** said that one section of the grid main would run over ground over the mountain at about 1,300 ft. for approximately one mile. That would have to be prepared for conditions when a temperature well below freezing point was present for several days on end.

(*Continued at foot of p.* 489.)

WITHIN THE COMPASS OF W-D



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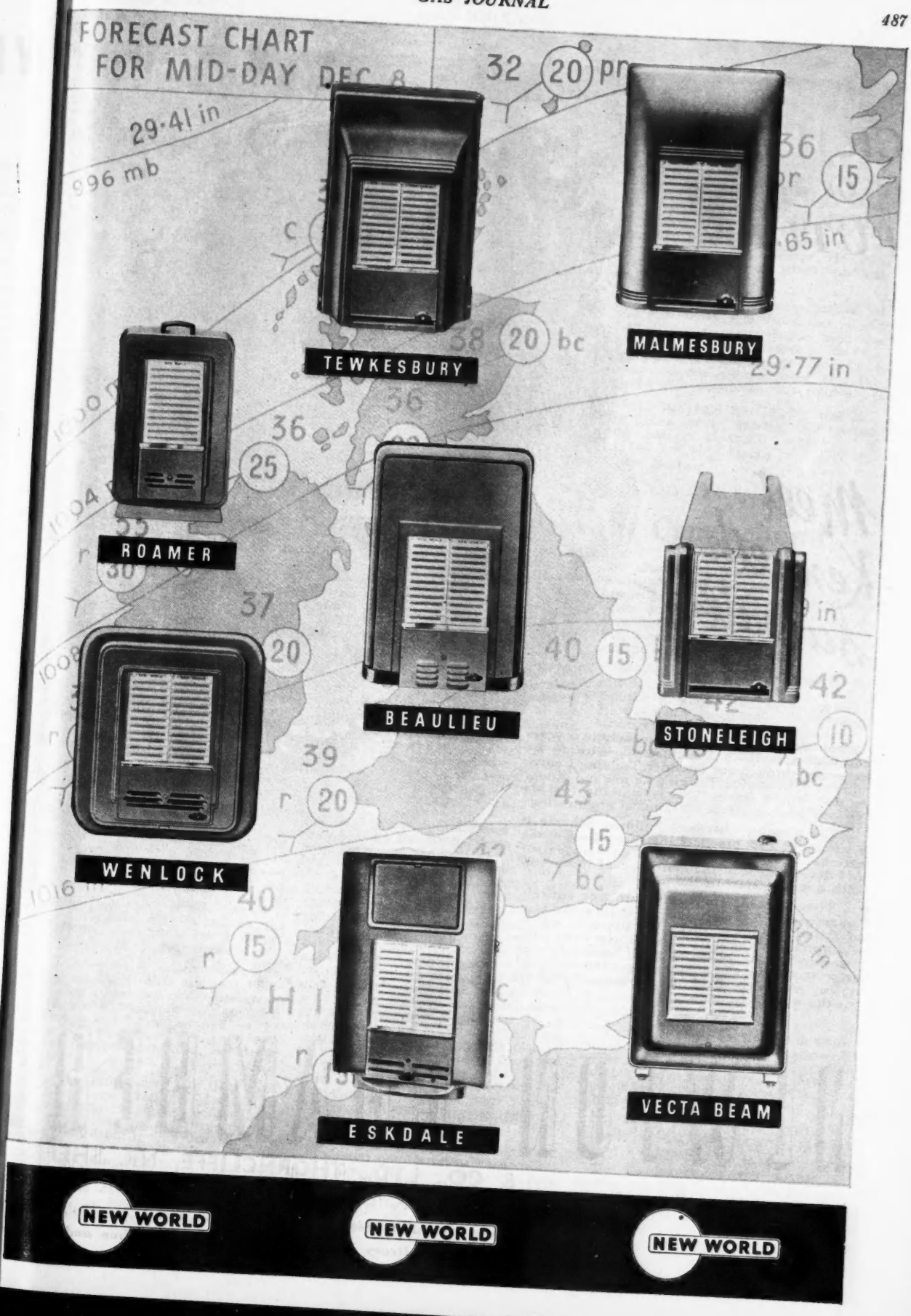
FORECAST CHART
FOR MID-DAY DEC 8
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TEWKESBURY
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STONELEIGH
WENLOCK
ESKDALE
VECTA BEAM
NEW WORLD
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NEW WORLD

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Gasholders . Purifiers . Condensing & Washing Plant . Tar Distillation Plants . Ammonia Liquor Concentration Plants . Sulphur Burners and General Heavy Engineering Products in Cast Iron and Mild Steel

Action for Damages Against Scottish Board

AN action for damages amounting to £8,000 was brought by Mrs. Dorothy Lillian Farley (or Mackie) against the Scottish Gas Board (as successors to the Kelty Gas Company) on November 7, in respect of an explosion two years ago at the Kelty gasworks in which her husband lost his life. It was heard before Lord Bladen and a jury in the Court of Session. The amount included £1,000 for each of her three children.

Mrs. Mackie claimed the accident was due to the negligence of defendants and their manager (Mr. William Cumming Hogg). She said her husband, James Brand Storrar Mackie, 29-year-old boilermaker, had been employed by Messrs. Henry Balfour & Co., Leven, since he was 14. He was frequently employed at gasworks but she did not know the exact nature of his work.

In evidence, Mackie's labourer, Young Pattie, said that along with Mackie and a welder he was repairing the crown of a gasholder at Kelty gasworks. When work began on September 27, 1948, the holder was in use. Fires broke out from time to time and to quell these they were provided with a hose and supply of steam. When Pattie and his workmates arrived on October 14 the holder was grounded. He saw the manager (Mr. Hogg) but received no explanation why the holder was down, and was not warned it would be dangerous to work on the holder that day. Pattie and Mackie began to cut away corroded plates with an axe. As Mackie took a swinging blow at a plate an explosion occurred. Mackie was blown over the side and witness was injured.

Answering Mr. W. Ross McLean, K.C. (for the Gas Board), Pattie said Mackie had stated the job could be done more easily if the holder was on the ground. He at first used a hammer and chisel, and then later an axe to cut the plates. He did not see sparks fly as Mackie wielded the axe.

Alexander Richardson Stark, the welder, said that when Mackie hit the plate with the axe a wall of flame shot up and there was a roar. Stark did not realise there was danger of an explosion, and he did not think Mackie realised it either. He was not warned by the manager that there was a special danger when the holder was grounded.

Dr. Andrew F. Muir, lecturer in engineering at Heriot-Watt College, Edinburgh, said there was more danger of explosion when the holder was grounded as there would be no pressure on the gas inside. If the gas was mixed with air an explosive mixture would be formed.

For the defendants, Mr. Hogg said that on several occasions Mackie had suggested that the holder be grounded so that he could make greater progress. Hogg pointed out to him that not only did the contract call for the holder to remain in commission but that that was the safest way to do the job. On October 13, the day before the accident, owing to the heavy demand by consumers, the holder became very low. As a safety measure witness closed the inlet valve. Next morning he found the holder completely grounded. He explained the position to Mackie and said there was a possibility of air being present with the gas. He told Mackie he could release the safety cap and that as soon as there was sufficient gas available the holder would be reinstated to its working level. Shortly afterwards, as witness was giving instructions for more gas to be made, the explosion occurred. Hogg told Mr. Ross McLean he had no idea Mackie was going to go on to the holder and rip off the old plates. Had he known Mackie was going to take such action he would have protested, not only because it was contrary to the contract but because it would be very dangerous.

Cross-examined by Mr. T. P. McDonald, K.C. (for Mrs. Mackie), Hogg said it was not dangerous to re-each move the safety cap from the roof of the holder. He had not instructed Mackie to remove the cap but had merely suggested that he could do so. Hogg admitted he had not specifically told Mackie on the morning of the accident that it would be dangerous to work on the grounded holder. He had, however, told him on several previous occasions.

Margaret G. Harrower, cashier at Kelty gasworks, said that a day or two before the accident Mackie used the phone in her office to speak to his firm. She heard him ask for the holder to be grounded, but gathered from what followed that permission was refused.

The jury held that Mackie was 25% to blame for the accident, and assessed the damages at £4,500, made up of £3,000 for Mrs. Mackie and £500 for each child.

New Showrooms at Campbeltown

THE Scottish Gas Board has established a well-appointed showroom in Longrow, Campbeltown, where the latest types of cookers are now on view and where local people are able to get information on the use of gas for domestic purposes.

There was a formal opening of the showroom by Provost R. W. Greenlees. Among those present were Sir Andrew Clow, K.C.S.I., C.I.E., Chairman of the Scottish Gas Board, Mr. D. D. Burns, the Deputy-Chairman; Mr. D. Melvin and Mr. D. Fulton, members of the Board; Mr. A. Jamieson, Group Manager, and Mr. R. H. Bowie, Group Accountant, and Mr. A. T. Sinclair, local District Manager.

Later the party adjourned to the Royal Hotel for lunch, where the Provost, proposing the toast of 'The Scottish Gas Industry,' said he was glad to see a Scot in charge of the Scottish Gas Board. When Sir Andrew first came to Campbeltown with members of the Scottish Gas Board he came to wrench from them their baby. They parted with that baby most reluctantly, because one did not like to part with it before it reached maturity. The Provost said he was very glad that the price of gas had not risen since the change-over, and he felt hopeful that eventually they might get it cheaper when the prices were put on a regional or national basis. He thanked Sir Andrew and members of the board for the interest which they had shown in their Royal Burgh and expressed the wish that they might go from strength to strength in their efforts to serve the community efficiently and well.

Sir Andrew, responding to the toast, said he was not sure that the gasworks was a baby. He did not know how long it had been in Campbeltown, but whether or not it had reached maturity the Board had received a mature manager. Only one thing was lacking —a place where the citizens could deal with them and be told a little more about gas. They now counted themselves privileged in securing, in one of their leading streets, a showroom where they could serve the public with greater efficiency.

Since he knew it first, Campbeltown had been an expanding place and he thought it would continue to expand. He was much struck with their housing schemes and was pleased to think that people in the new houses were being taught the value and importance of gas.

Mr. D. D. Burns proposed the health of 'Our Guests,' and in doing so thanked the Town Council and the Burgh Chamberlain for the assistance they had given in the handing over of the works.

WALES JUNIORS—Continued from p. 484

Any appreciable amount of naphthalene at this point would cause trouble and it was essential to get the naphthalene content down. He would like to know the estimated dewpoint of the gas coming into the grid in summer and winter, and he wondered whether the ¾ grain naphthalene mentioned was the maximum or the minimum.

Mr. **Barrett** said that the ¾ grain mentioned was the maximum guaranteed winter figure and 1½ grains the maximum summer figure. He also stated that the gas would be cooled to within 3 degrees of the cooling water.

Mr. **Alun West** remarked that the capacity of the after-coolers was far greater than usual.

The meeting closed with a vote of thanks, proposed by Mr. **C. E. Banham** (Cardiff), seconded by Mr. Reeve, to the N.C.B. and to Mr. Barrett, Mr. West, and Mr. Childs for conducting the party around.

Lord Hyndley Urges Smoke Abatement

MANCHESTER FUEL EFFICIENCY EXHIBITION

IT may be true to say that 'where there's smoke there's fire,' but we must see to it that it need not be true to say 'where there's fire there's smoke.' Thus said Lord Hyndley, Chairman of the National Coal Board, in opening a Fuel Efficiency in Industry and Home Exhibition at the City Hall, Manchester, on November 22.

Lord Hyndley expressed his pleasure at being present at the first post-war exhibition of the National Smoke Abatement Society on Fuel Efficiency in Industry and Home and to see that it had received such wide support. The National Coal Board, which was the producer of the 'offending object,' raw coal, was in full agreement with the aims and objects of the Society. But as well as producing raw coal the Board also produced a large amount of smokeless fuel. Last year their coke ovens produced 6½ mill. tons of coke, most of which was used in the production of iron and steel, but nearly 2 mill. tons went to other industry and into domestic fires and boilers. Plant extension would lead to the production of double the present quantity of phurnacite. The Board produced about 3¾ mill. tons of anthracite each year, but it was in such great demand for export that he was afraid there was not much left over for use at home. The smaller sizes of anthracite went only to those consumers who had selective appliances specially designed to burn them.

The Board was closely associated with the Coal Utilisation Joint Council, whose objects were to promote the efficient use of solid fuels in modern domestic appliances. They staged a series of exhibitions, and they were now in process of developing a service and showroom scheme through which it was hoped to provide a complete sales and servicing organisation which would compare with that offered by the other fuel industries. The aim would be not only to give sound advice on the choice and correct installation of modern appliances, but also to provide efficient after-sales service and maintenance and to give guidance on the most suitable types of solid fuel. A centre had been opened in London where the staffs of the appliance distributors and coal merchants could be fully trained in that work and where advice could be given to visiting architects, builders, and other people who were interested.

Scope for Improvement

All that would help them to become more efficient users of solid fuel, and there was immense scope for improvement. He was sure he would not be far wrong when he said that every single home in the country could do with at least one new and more efficient appliance—a fireplace, a stove, a boiler, or the like. By making them really efficient the householder would not only be doing a great service to the nation, but would also cut down his household expenditure in a suprising way. There was no doubt that a properly installed and operated modern solid fuel appliance gave off much less smoke than the older types of ranges and open fires. But they wanted to see more than that done about the smoke problem.

'Today only very little of our household solid fuel is smokeless, and there is not much prospect in the immediate future of having enough smokeless fuel to go very much further,' added Lord Hyndley. 'But that does not mean we should sit down quietly and say that smoke emission is inevitable and must be accepted. If the hopes of the Simon Committee for increasing the production of smokeless fuels are not likely to be realised is it not possible to develop appliances capable of burning bituminous coal smokelessly? Intensive research is being carried out on this problem by individual manufacturers and organisations such as the British Coal Utilisation Research Association. It can be claimed with some confidence that the problem of designing a closed stove which will burn bituminous coal smokelessly is within sight of solution. But smokeless burning in an ordinary open grate is a much more difficult problem and will take a long time to solve.'

The industrial user as well as the householder must use his fuel efficiently, and with as little smoke as possible. Industry's demand for coal was increasing by leaps and bounds. In the first ten months of the year the consumption of coal by industry and public utilities had increased by 3.8 mill. tons over that for the same period last year. Unfortunately the production of coal was not rising proportionately. They would have the greatest difficulty in meeting the demand at home and abroad. It was therefore an urgent national need that industry at home should improve its methods of using coal.

It might be true to say that 'Where there's smoke there's fire,' but they must see to it that it need not be true that 'Where there's fire there's smoke.' In this Lord Hyndley promised the complete goodwill and wholehearted support of the National Coal Board. The problems were complicated and difficult, but exhibitions of this kind enabled the public to see the great strides which had been made since the war in the design of appliances.

The Lord Mayor of Manchester (Alderman Colonel S. P. Dawson), who presided, said it was fitting that when there was to be a curtailment of the use of fuel there should be an exhibition showing the efficient use of that commodity, and they should use it to the best of their ability.

Mobile Fuel Testing Unit

The Middlesbrough undertaking of the Northern Gas Board was recently the venue for a demonstration to local industrialists of one of the mobile testing units of the Ministry of Fuel and Power.

Savings in fuel consumption of an average of about 15% have been found possible as a result of investigations made by the mobile testing unit into the operation of a number of industrial undertakings with an aggregate annual consumption of approximately 100,000 tons of coal and 5,000 tons of oil. In certain instances the investigations related to boiler plant only so that the total savings had the tests been applied to the full range of operations in the undertakings would certainly have been higher.

The unit consists of a three-ton van specially built for the transport of delicate instruments over rough ground, and has a floor space of 15 ft. x 7 ft. 6 in. It has been planned with great care so that every inch of space is used to the best advantage, and it is equipped with an extensive range of indicating and recording instruments.

The unit is staffed by specialist fuel engineers. When visiting a factory the engineer in charge first has a full discussion with the works technical staff and examines all relevant information on the particular processes. A tour of the works is then made and a flow sheet drawn to show the process sequence. In addition, a line diagram is prepared of all the heat and power services, and note is taken of any special advice required on particular problems.

Worthwhile Service

Dame Vera Laughton Mathews, who has been appointed adviser to the Gas Council on women's affairs, visited Manchester for the opening of the Fuel Efficiency Exhibition and afterwards met the home service advisers of the North Western Gas Board for tea at the demonstration theatre at Stretford.

She told her audience that they had a real mission in life. It was not just being concerned with one of the most important industries in the country. Theirs was a worthwhile service apart from offering them a professional job since they were able not only to help other human beings, one of the best things they could do in life, but they were able also to help in establishing a higher standard of home-making and homecraft.

Dame Vera said that her new post as adviser on women's affairs to the Gas Council had a two-fold purpose—to advise on the best ways of representing the gas industry to housewives, and on the employment of women in the industry.

Sunderland Pressures

Complaints about deficiency of gas pressure in the Lower Ford area of Sunderland have been vigorously tackled by the Northern Gas Board. Mr. E. Crowther, the Chairman of the Board, has informed residents that matters are not satisfactory chiefly because of the greatly-increased demands on the principal mains supplying the area, which have developed during the past few years.

Until a new feeder can be provided which will correct the position, a smaller semi-temporary scheme is to be carried out. A short length of main will be extended into the area from one which links the two Sunderland works, using pipe from very limited stock.

'This, I believe, will serve as a palliative until such time as the major scheme can be completed,' states Mr. Crowther.

Meanwhile representatives of Ryhope (Co. Durham) Council, on the outskirts of Sunderland, have been meeting the Northern Gas Board about the unsatisfactory supply to their area. Mr. G. E. B. Perfrement, one of the Council's representatives who met the Board, stated at a meeting of the Council on November 21 that it had been agreed that gas pressure should be boosted at certain hours to enable housewives to do their cooking.

The reason for the low pressure in the district was that plant was getting old and replacements were difficult, said Mr. Perfrement. As soon as new plant arrived, however, there would be an improvement in the position. Meanwhile governors had been fitted to gas mains in an effort to equalise pressure and this had had some effect. If, however, the winter was hard, conditions would not be good.

Home Service at Barry

Mrs. Eileen Murphy, Home Service Organiser of the Gas Council, spoke at the official opening of a new cookery demonstration theatre at the Barry (Glam.) showrooms on November 29. 'The home-help who lives in,' as she had heard gas described, had proved reliable in all its domestic uses.

Also present were the Chairman of the Wales Gas Board (Mr. T. Mervyn Jones), Mr. S. D. Coole (Engineer and Manager, Barry), and the Mayoress of Barry (Mrs. P. D. Richards), who opened the theatre.

Women were the best customers to the gas industry and unless it continually improved its services to them the industry could not flourish, Mrs. Murphy declared.

She had one criticism to make on the interior planning in new houses. She had recently visited new council houses, each of which had a gas cooker, wash boiler, and panel gas fire. She was disappointed to see that the cooker in every kitchen had been placed with its back to the window and in a corner. The effect was that when the housewife opened the oven door she had the door on one side and the wall on the other with the light in her eyes so that she could not see inside the oven.

Mr. Mervyn Jones emphasised the need for using gas in the most economical way in the interest of fuel saving. This theatre offered facilities for educating the public in the best use of gas.

Miss Vivienne Couth has been appointed home service adviser to the Barry undertaking.

Objection was Made at Kirkcudbright Town Council regarding the small amount of compensation paid by the Gas Council for the local undertaking. One member referred to it as 'daylight robbery.' The sum allotted was £404, which included payment for the gas manager's house. It was contended that the house, estimated to be worth £2,000, was no part of the gas undertaking and should have been paid for, apart from the gasworks. The Council agreed to raise the matter with the Gas Council.

WESTERN JUNIORS AT EXETER

About 60 members of the Western Junior Gas Association and their friends spent an interesting afternoon at the Exeter works of Messrs. Willey & Co., Ltd., on November 8.

Members were surprised at the great variety of articles manufactured by this firm—amply illustrated when parties were shown the foundry, engineering shop, machine shop, meter shop, brass shop, and plating plant.

Among the variety of castings being produced in the foundry most interest was displayed in the manufacture of cast-iron dry meter cases for export to South America, where this type of case is extensively used. The automatic machines turning out parts for meters in the machine shop proved most fascinating, and in the meter shop members were shown all sizes and types of meters in various stages of construction, including 60,000 cu.ft./hr. dry meters.

In the brass shop a practical demonstration was given of the very large range of finishes obtainable with a modern electro-plating plant.

At tea, Mr. F. W. Sansom (the President), in proposing the vote of thanks to the management and members of the staff who had acted as guides, said that in preparing the programme for the coming year one possible visit immediately presented itself in Messrs. Willey & Co., the largest industrial gas consumer in Exeter. He was very sorry that Mr. Stephen Simpson (Chairman of the Company) was unable to be present. Mr. Simpson, who was the pioneer of the slot meter, was in no way content to rest on past laurels and was continually devising further improvements in gas meters in order to give the best possible service to the industry.

Response was made by Mr. Thornton Willey, grandson of the founder of the firm, who also spoke of Mr. Simpson's regret at being unable to be present.

Tariffs and Gas and Coke Prices

By R. H. EPPS,
Secretary, Eastern Gas Board.

EXAMPLES of the difficulties with which the Board is faced when dealing with the problems of gas tariffs were given by Mr. R. H. Epps, Secretary of the Eastern Gas Board in a talk to the Eastern Gas Consultative Council on November 20. Much detailed work would have to be completed before many of the problems could be solved, he said.

In fixing a tariff and making agreements an area board must not show any undue preference to any person or class of persons. Time, geographical situation, user, and methods of payment were all matters which had to be taken into consideration for the purpose of deciding what was a class of persons; for example, credit or prepayment domestic consumers living in the same parish geographically were one class of consumer but the two methods of payment created two different classes.

About 70% of the Eastern Board's revenue was from sales of gas. The Board was one unit composed of many smaller units. It had to sell gas in competition with other forms of fuel and if it was going to survive, the price it charged for its gas must be such as would satisfy the consumer that the price of gas and the benefits derived from its use were better than those afforded by other kinds of fuel.

Making Ends Meet

Starting therefore from a competitive price, it must first confine its expenditure to its income. It must then apportion its expenditure over the varied forms of tariffs so as to ensure that the income from gas sold under such tariffs would balance with the total expenditure, including annual capital costs, bearing in mind two very important factors: (a) That the Board must maintain a supply of gas irrespective of cost —for that was its statutory duty—and (b) that any person other than an industrial user who was within 25 yards of any main of the Board was entitled to be connected to the mains. The latter obligation might become a very onerous one to the Board, particularly where the demand was occasional or seasonal, as was the case with a gas fire load.

Wherever there was a potential demand for gas the Board must provide manufacturing and distribution plant to meet the needs of the consumer whenever they arose. The problem was first to estimate the demand, obtain the plant, and then decide which consumer or class of consumer was to bear the extra cost incurred by the Board in making provision for an uncertain demand.

He did not propose to go into the intricacies of load factors, but a simple illustration might be given in the case of the domestic consumer. The peak demand occurred for about two hours on a Sunday. The Board must therefore provide manufacturing and distributing plant to meet that peak demand occurring for a very short period. Modern gas practice was to provide for that peak demand by way of carburetted water gas plant which could be opened up or shut down intermittently without undue harm occurring to the plant. Coal gas plant was used to provide for the base load, for it must be borne in mind that to use coal gas plant intermittently would cause serious deterioration in the plant.

In theory annual capital costs to meet the peak demand should only be paid by that class of consumer creating the peak demand. To measure the additional amount per therm that such class of consumer should pay required knowledge of what was the annual demand from such class of consumer, the intermittent peak load and its duration, all of which required the collection and collation of information as to the type of appliance fixed on the district, and hourly daytime output of gas from the works.

Capital Cost of Main

Annual capital cost on trunk mains was another factor which had to be taken into consideration. In theory consumers supplied from a gasworks five or six miles distant ought to pay in the price of gas more than those living close to the works, for it naturally followed that if there was no gasworks within the vicinity of a class of consumer a transmission main had to be laid and capital costs had to be borne by consumers. On the other hand the increased output from the gasworks supplying the two areas might very well reduce the cost per therm to consumers in the area nearer the works. Whether any savings or additional cost should benefit or be borne by all the consumers or a particular class of consumer was a matter of policy to be determined by the Board and given effect to in the tariff structure.

The Board had 92 manufacturing stations, both large and small. The cost of gas into holder might be greater at a small works than at a larger works. Whether the smaller works should be shut down and gas supplied from the larger works would depend on whether the capital costs of a trunk main plus the charge for obsolescence in respect of the works displaced by the link-up was less than the increased cost of supplying gas manufactured at the local station.

Whatever form of tariff was used, other than the flat rate, all expenses of the Board must be divided into : (a) Expenditure which varied with consumption, such as coal, wages (to a certain degree), and (b) costs which did not vary with consumption—*i.e.*, costs incurred whether consumption was large or small, such as the cost of repairs to mains, office administration and salaries of technical staff. The best illustration in the latter classification was that of clerical salaries, for the total cost of clerical salaries to record the sales to 100,000 consumers would be the same if consumption were 100 therms or 200 therms per consumer, because no additional work was involved in reading the meters, recording the consumption, and rendering the account to the consumer, but it was obvious that if consumption was 100 therms the cost per therm was twice as much as if the consumption were 200 therms per quarter.

Another important matter affecting the Board's finance and consequently its gas tariff policy arose from the formation of new town development corporations within the area, and the development of local authority housing schemes. Gas could not be provided unless manufacturing and transmission plant and district mains had been constructed before the demand arose. Capital costs therefore had to be borne by the Board in advance of gas demand. The Board had no reserve out of which to meet that expense, and accordingly any deficiency on revenue due to development of housing estates must be borne by existing consumers. The problem arose as to which class of consumer and in what proportion should this expense be borne, and whether the expense should ultimately be borne by those consumers for whom the plant and main were specially provided. The Board could not produce a balanced tariff policy until it was in possession of considerable financial and statistical data which included: (a) Knowledge of consumer demand, both current and potential, (b) a complete analysis of expenditure as between that which varied with output and that which was not related to output, and (c) the comparative costs of manufacturing coal gas and water gas. With the exception of one or two of the larger undertakings the Board found that reliable statistical data was not available, and time alone would cure the defect.

Administration

Dealing with administration, Mr. Epps said 95% of the consumers used 68% of the Board's output of gas for domestic purposes 1% used 17% of the gas for industrial purposes, and 4% of the consumers used 12% of the gas for commercial purposes. The Board had to deal mainly with domestic consumers, and administration was therefore mainly concerned with that class. For ease of administration gas tariffs to all classes of consumers must be simple, particularly so in the case of domestic users.

Having defined the flat rate, two-part, step rate, and block rate charges, Mr. Epps told the Council that on vesting date the board inherited 444 gas tariffs comprising all four rates with considerable variations. The Board's short-term policy, he said, was generally to continue the tariffs in force on vesting day, except in certain cases where the price of gas on that day was in excess of the ceiling price fixed by the Board. Investigations into methods of charge extended over a period of three months, involving much time and labour. Such a state of affairs was to be expected when 98 undertakings each with separate geographical boundaries and with different methods of charge became telescoped into one unit. Consumptions were found in many instances to have been aggre-

gated for discount purposes and indeed for the purpose of block and step rates, even though the consumptions fell to be paid for under different methods of charge. There were cases where aggregation of consumption for discount purposes was not of general application in the former undertaking to which it was applicable. The Board, however, had continued the practice of aggregation where it existed before vesting date, but had not extended it to new consumers in view of the numerous difficulties which were inherent in the practice.

Some 363 special contracts under which gas was being charged at special rates had to be examined. Comparisons with other contracts and methods of charge had to be made to see whether a tariff had been created or whether it was a special contract within the meaning of the Act. In one undertaking alone there were 76 different tariffs, mainly for geographical reasons. The method of applying rates of discount for gas prices varied; in some cases it was a flat rate, in others a step rate, and in others a block rate. The Board found that some undertakings allowed what was intended to be a settlement discount at any time, while another undertaking seemed to have had a tariff for each separate use to which gas could be applied.

Investigation showed that a general increase could not be applied to each therm of gas sold, for many of the tariffs in force at vesting date provided that a variation in the price of gas under such tariffs was a proportion of the variation applicable to other classes of consumers. One of the Board's greatest difficulties was to ascertain the number of therms sold under each tariff, for that information was required as a basis to calculate the increase in revenue.

The gas industry was a two-fuel industry. The fundamental basis of its finance had always been that the price of gas must be such that after crediting the proceeds from residuals the balance of expenditure, including interest on capital outlay, depreciation and sinking fund charges, must be met out of the price of gas. Any decrease in the price of coke must correspondingly result in an increase in the price of gas, provided always that the Board was unable to effect the necessary savings to offset the decrease in revenue from that source. Although coke was a necessary product of coal carbonisation the Council would realise that in the larger undertakings coke was not sold as it came from the retort. Expensive plant had to be acquired for screening coke into grades, and graded coke might therefore be considered a manufactured product. For every decrease of 1s. in the price of coke the price of gas would need to be raised by approximately 0.05d. per therm.

Summing up, Mr. Epps said the Board must ensure that its income would meet its outgoings, must make a careful analysis of its expenditure, must know the sales of gas under each tariff and what price concessions could be given in respect of varying consumptions. The Board must fit its organisation to its business and consequently any change in policy might involve new stationery, new machines, and new methods of procedure. The Consultative Council could be of the greatest assistance to the Board in its relations with the consumer by adopting a broad outlook in relation to gas prices.

Alderman **R. Turner,** J.P., Chairman of the Council, in thanking Mr. Epps for his talk, said they were going to get down to the problems of tariffs in the Eastern area and he would see that they were brought forward at all the district committee meetings in the future.

Mr. **Epps** said the Board had appointed a committee who hoped to produce proposals for a balanced tariff policy within the next six months. The Council would be asked for its observations because the Board realised that its members were the people who could help more than any others. In answer to questions about the percentages of the different classes of consumers he said that the Sunday midday peak load was attributable entirely to the domestic consumer, and no change in the proportion of industrial consumers would affect the position.

Questions were asked about the Board's annual report and accounts, and members were eager to know whether information would be available as to the working results of individual undertakings, such as was formerly disclosed either in the annual report of the engineer and manager of a municipal undertaking or in the directors' reports and accounts in the case of companies.

Mr. **Epps** explained that the reports of all the 12 area boards together with that of the Gas Council would be submitted in due course to Parliament by the Minister of Fuel and Power. It was extremely unlikely that the individual working results of undertakings would be available. Even under the old regime a company did not give the results of separate gasworks.

'In other words the reports will be of no use whatever,' commented a member of the Council. When reminded that area results would be given he added: 'The Board is responsible for a very big area.' The Chairman expressed the view that the Board's second annual report would be of greater interest than the first, in that it would afford the earliest opportunity for making proper comparisons.

Gas Stock Values

The Minister of Fuel and Power has declared by Order that the values of the undermentioned securities have been determined under Part II of the Act, the conversion date being November 20, 1950, on which date the securities were extinguished and the holders thereof became instead holders of British Gas 3% Guaranteed Stock, 1990-1995 (issued at par and redeemable at par), calculated in accordance with the rates mentioned below.

Where payments of interest made on or before November 1, 1950, by the Gas Council under direction of the Minister are not sufficient to discharge the interest due for the three successive six-monthly interest periods ended October 31, 1950, the Gas Council will, on or about January 17, 1951, make good the deficiency by paying to holders of the securities as at September 26, 1949, March 27, 1950, and September 25, 1950, any balance due for the first, second and third periods respectively. The fourth six months' interest will be paid on the British Gas Stock on May 1, 1951.

The usual procedure regarding transfers, the exchange of certificates, etc., will apply on and from the conversion date to holdings of British Gas Stock issued in exchange for the old securities. The securities are in £100 units except where shown otherwise.

Company	Compensation Value
Barnstaple 3½% Red. Deb. Stock, issued before January 1, 1946	£102
Berkeley 4½% Red. Debs.	£100
Bognor and District 3½% Red. Deb. Stock	£105/10/–
Do. 4½% Red. Deb. Stock, 1949	£102/10/–
Do. 4½% Red. Deb. Stock, June, 1954	£106
Do. 4½% Red. Deb. Stock, September, 1954	£106
Broadstairs 3½% Red. Deb. Stock ...	£100
Bude 6% Red. Deb. Stock	£111
Caistor Ord. Shares (£10 units) ...	£10
Do. Ord. Shares (£4 unit) ...	£4
Camborne 3½% Red. 1st. Mort. Debs.	£100
Cannock 4% Red. Mort. Debs. ...	£102/10/–
Do. 3½% Red. Mort. Debs. ...	£100
Chipping Norton 6% 2nd Mort. Debs.	£100
Do. 6% 3rd. Mort. Debs. ...	£100
Croydon 4% Red. Deb. Stock ...	£100/10/–
Do. 4% Pref. Stock	£101
Do. Sliding Scale Stock* ...	£138
Do. Max. Div. Stock*	£115
Dorchester 3½% Red. Mort. Debs. ...	£100
Dursley 4% Red. Debs.	£102
East Surrey 3½% Red. Deb. Stock, issued before January 1, 1946)	£102
East Wight 4% Mort. Deb. Bonds ...	£100
Ely 4% Red. Debs.	£100
Freshwater 4% Red. Mort. Debs. ...	£100
Glastonbury 4% Red. Debs.	£101/10/–
Haywards Heath 3½% Red. Deb. Stock	£102
Heckington 4½% Red. Mort. Debs. ...	£101
Herne Bay 5% Red. Debs., 1950 ...	£104
Ilfracombe 3½% Red. Deb. Stock ...	£102
Leominster 3½% Red. Debs. (£10 unit)	£10/3/–
Ludlow 4% Red. Debs.	£101/10/–
Do. 4% Red. Debs. (£50 unit) ...	£50/15/–
Do. 4% Red. Debs. (£10 unit) ...	£10/3/–
Mablethorpe and Sutton 4% Red. Debs., all redemption dates ...	£100
Melton Mowbray 4% Red. Debs. ...	£101/10/–
Midsomer Norton 5½% Red. Mort. Debs., October, 1951	£103
Do. 5½% Red. Mort. Debs, December, 1951	£103
Do. 5½% Red. Mort. Debs., 1952	£104
Do. 4% Red. Mort. Debs. ...	£100/10/–
Padstow and St. Columb 4½% Red. Debs.	£103
Rugby 3½% Red. Deb. Stock... ...	£100
St. Austell 4% Red. Debs.	£100
Do. 4% Red. Debs., 1958 ...	£101/10/–
St. Blazey 4½% Red. Debs.	£100
Seaton, Axminster and District 4% Red. Mort. Deb. Bonds ...	£101/10/–
Do. 3½% Red. Mort. Deb. Bonds, 1952	£100
Do. 3½% Red. Mort. Deb. Bonds, 1966	£100
Shaftesbury, Gillingham and District 4½% Red. Debs.	£105
Sleaford 4% Red. Mort. Debs. ...	£101
Soham 4½% Red. Debs.	£105
Taunton 4% Red. Deb. Stock ...	£100/5/–
Truro 3½% Red. Deb. Stock, 1966 ...	£100
Do. 3½% Red. Deb. Stock ...	£99
Wells 4½% Red. Deb. Stock	£102/10/–
Westbury 3½% Red. Debs., 1952, issued September 29, 1947 ...	£100
Whitchurch (Salop) 3½% Red. 1st Mort. Debs. (£50 unit) ...	£50
Winsford 3½% Red. 1st Mort. Debs....	£100/5/–

* The value of these quoted securities is the value for the purposes of Section 25 (2) of the Act as increased by direction of the Minister in accordance with Section 26 (1) of the Act.

Institution Examinations, 1950

The Board of Examiners of the Gas Education Committee of the Institution of Gas Engineers submitted the following report on the 1950 Examinations

DURING the year 1949-1950, the members of the Board of Examiners and Assessors, appointed by the Council for the Major Courses were:

Examiners.—F. White, B.Sc. (London); J. Castle, B.Sc. (Ormskirk); L. J. Clark, B.E.M., M.Sc. (London); C. A. Deas (London); W. S. Hubbard (Liverpool); E. T. Pickering, B.Sc. (Birmingham); W. F. Thorne, B.Sc. (Poole); F. R. Weston, B.Sc., PH.D. (London)—Gas Engineering (Manufacture).

J. H. C. Bates (London; Chairman); F. Bell, B.Sc. (Liverpool); E. W. B. Dunning, B.Sc. (London); R. F. Hayman, B.Sc. (London); W. T. Hird (Cardiff); F. W. Sansom, M.B.E. (Exeter); H. Wadsworth (Bath); J. F. Waight, B.Sc.(Eng.) (Birmingham)—Gas Engineering (Supply).

Assessors.—Gas Engineering (Manufacture) and (Supply). West of Scotland: J. M. Dow (Paisley); W. M. Gledhill (Stirling). East of Scotland: D. D. Melvin (Edinburgh); J. W. Napier, M.B.E. (Dunkeld).

COMPARATIVE SCHEDULE OF EXAMINATION CANDIDATES

Subject	Grade	1949 Internal	1949 External	1950 Internal	1950 External
Gas Engineering (Manufacture) ...	Ordinary	140	70	133	64
	Higher	64	43	92	34
	Diploma	—	10	—	7
Gas Engineering (Supply)	Ordinary	173	68	238	98
	Higher	49	19	72	32
	Diploma	—	3	—	7
Total...		426	213	535	242
Grand total		639		777	

ORDINARY GRADE GAS ENGINEERING (MANUFACTURE)
Number of candidates who sat for the Examination

Class	Internal—133 No.	Internal—133 %	External—64 No.	External—64 %	Total—197 No.	Total—197 %
First with Distinction	—	—	—	—	—	—
First	7	5.3	3	4.7	10	5.1
Second	72	54.1	31	48.4	103	52.3
Fail	54	40.6	30	46.9	84	42.6

There were 138 more candidates this year than last year, representing an increase of over 20%. It is greatly to be regretted that this satisfactory position was accompanied by a marked depreciation in the general standard of answers submitted. It may be that the pending change of Regulations has tempted some candidates to enter before they are fully prepared. The Board of Examiners wishes to make it quite clear that it has no intention of lowering the standard of marking for the few examinations which remain to be conducted under the old Regulations.

The Higher Grade Gas Engineering (Manufacture) papers were reasonably well answered, and in this Grade there was a slight improvement in the results as compared with last year, but in all other Grades and, in particular, Higher Grade Gas Engineering (Supply) there were a larger number of failures and fewer first-class passes.

No candidate achieved distinction level, and the Board was unable to recommend the award of either the Charles Hunt Memorial Medal or the Herbert Lees Memorial Prize.

Some of the Examiners have commented upon the indifference of the sketching of some candidates and the majority have again thought it necessary to refer to the poor standard of presentation.

The failure of over 40% of the candidates cannot but be considered as poor, especially when it is also noted that, of the passes, the majority obtained only between 50 and 60% of the possible marks. Many candidates obviously had little knowledge of the fundamental chemical and physical principles underlying the various processes on a gasworks. The syllabus of the Ordinary Grade especially emphasises the need for a sound knowledge of such principles and it is felt that the lack of such knowledge, as revealed by the examination, must be attributed in some degree to the inadequacy of the instruction received.

The principal criticism, however, is of the poor standard of presentation. The orderly arrangement of answers would in many cases save candidates much time and, when the question is so worded as to help the candidate choose the correct sequence, there is no excuse for the very confused answers often supplied. It is felt that many candidates should not have sat for the examination without further preparation and practical experience.

In the Higher Grade Gas Engineering (Manufacture) the general standard of English was very low, and candidates will require to pay more attention to this matter if they aspire eventually to obtain executive or administrative posts. In particular, it was noted that many candidates, in the course of one answer, used more than one mood and tense in the verbs.

It was also noted that far too many candidates wrote irrelevant matter without regard to the specific points asked for in the questions. Further, many were lacking in fundamental knowledge. Some candidates failed to identify their answers, and the general layout of some papers was most untidy.

There were 10 candidates for the Diploma in Gas Engineering (Manufacture), of whom three re-entered only for the Home Paper. One candidate submitted a Thesis entitled "Modifications to Design and Operation of an Old Gasworks to Meet Increased Present-Day Demands," which was accepted for the award of a Second-Class Diploma. Nine Home Papers were submitted, some being of high quality, but the answers to the written examination were of much lower standard.

Seven candidates entered for the written examination and, in general, the standard was considered low for the Diploma Grade. The candidates dealt with the purely descriptive questions fairly well, but supporting technical data were lacking. One would have expected Diploma candidates to give clear, concise, and complete answers and good diagrams and sketches. Instead, the reverse was the case and the standard attained by the candidates as a whole left much to be desired.

In the Ordinary Grade Gas Engineering (Supply) the questions in Group A on mains and services were well answered by most students and, in fact, the majority who passed can attribute it to the good marks obtained in the first section.

The questions in Groups B and C were, in general, poorly answered. The standard exhibited varied considerably and the large number of mediocre papers was disappointing. The general principles, particularly of the utilisation of domestic and industrial gas, were not nearly as well understood as they should have been. It was most surprising that a simple question like that which asked for notes on four out of five different types of water heating systems, should have been so inadequately answered. The answers to the Industrial questions again showed that the candidates did not give sufficient attention to this section of the Gas Supply course. Candidates should read the questions carefully and answer only what is required; too much irrelevant matter was presented.

The Higher Grade Gas Engineering (Supply) examination was extremely disappointing, and the standard reached by most of the candidates was unusually low. This was the worst set of scripts which the Examiners have had in this Grade for some years, and it must be assumed that far too

HIGHER GRADE GAS ENGINEERING (MANUFACTURE)
Number of candidates who sat for the Examination

Class	Internal—92 No.	Internal—92 %	External—34 No.	External—34 %	Total—126 No.	Total—126 %
First with Distinction	—	—	—	—	—	—
First	8	8.7	3	8.8	11	8.7
Second	51	55.5	18	53.0	69	54.6
Fail	33	35.8	13	38.2	46	36.7

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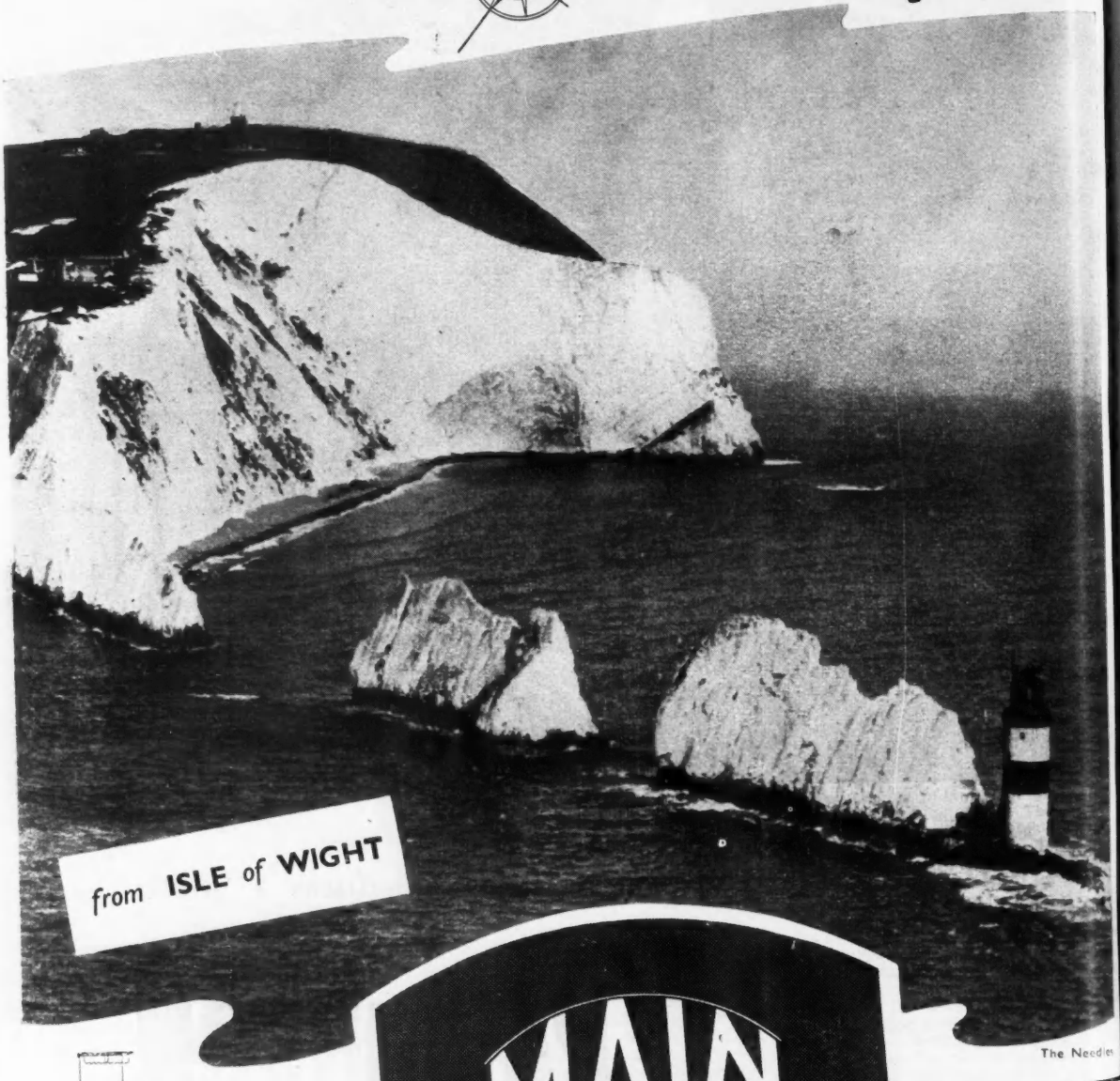
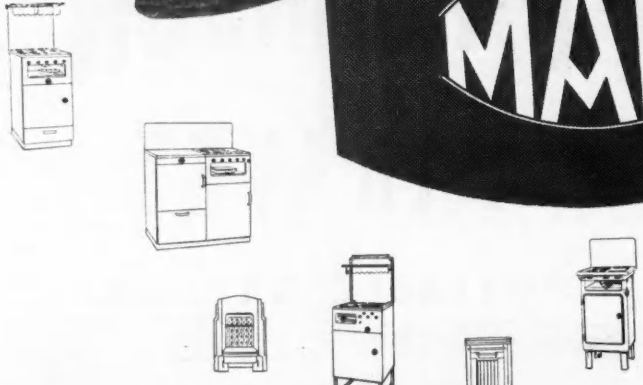


MAIN



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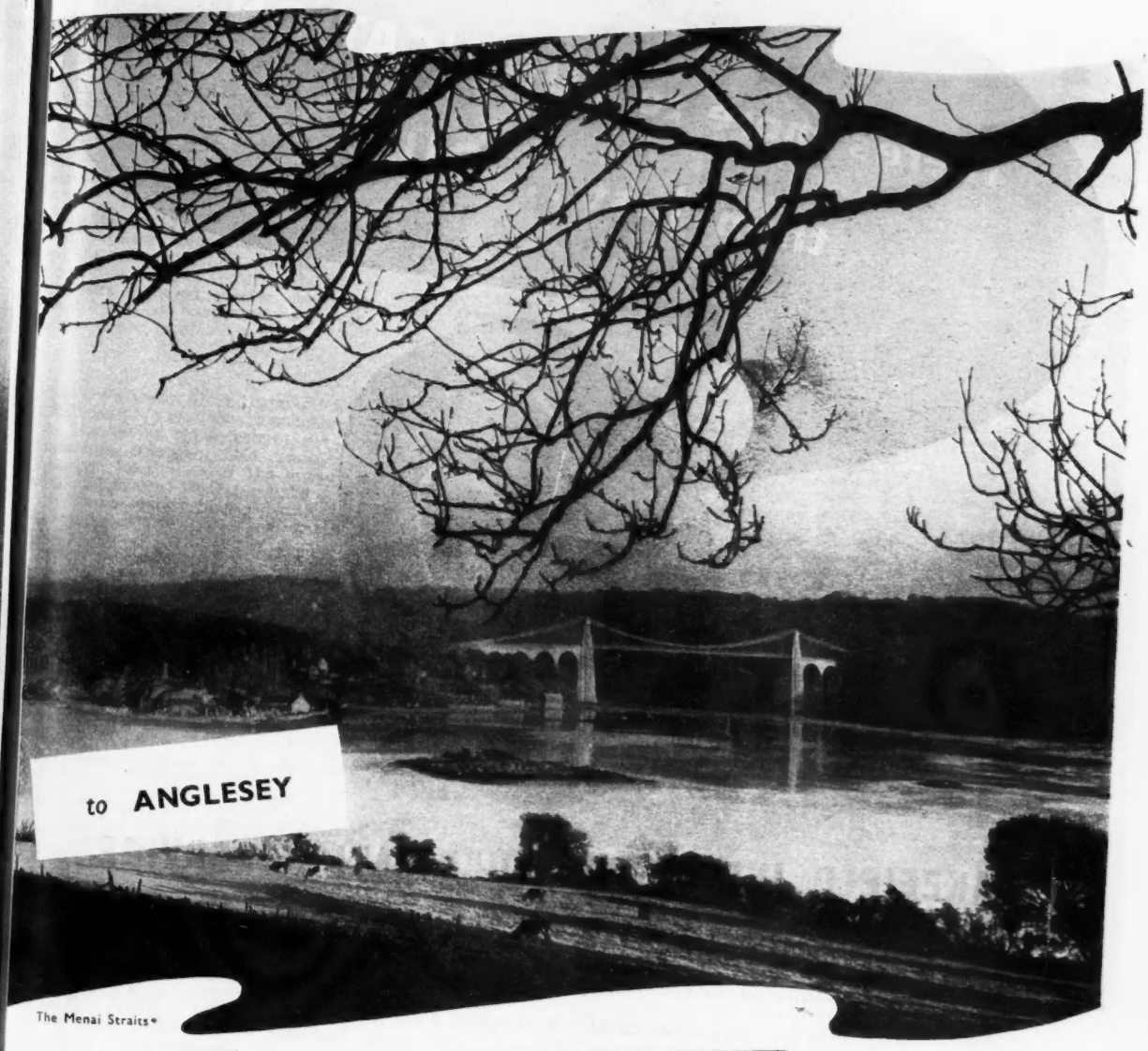

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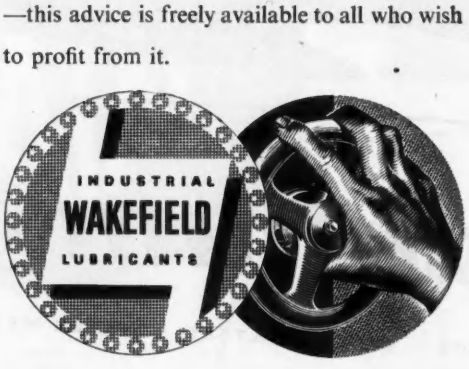

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many candidates entered for the examination before being fully prepared.

While there were a few notable exceptions, most of the candidates showed a lack of practical knowledge of the subject and the majority presented their answers in an untidy fashion; some of the sketches were most crude.

There were seven candidates for the Diploma in Gas Engineering (Supply), six of whom answered Question 1 of the Home Paper and the seventh Question 2. None of the Home Papers was of first-class standard and, of the six Papers which were accepted as of pass standard, three were in the lower range of second class.

The answers to the written examination were mediocre, four candidates failing and the remaining three obtaining only second-class passes. The majority of the candidates displayed only an elementary knowledge of Gas Supply matters, particularly in respect of district work.

BELOW is the list of candidates who were successful in the 1950 Examinations in Gas Engineering (Manufacture) and Gas Engineering (Supply) held under the Education Regulations of The Institution of Gas Engineers. The list includes candidates who passed the Main Subject Examinations in previous years and are now qualified for a Certificate by completing ancillary subjects.

EXTERNAL CANDIDATES (86)

Diploma in Gas Engineering (Manufacture) (8)

Class	Name	Town
Second	Brown, K. H.	Manchester
,,	Collins, L. J.	Luton
,,	Edwards, K. R.	Rotherham
,,	Hall, G.	Luton
,,	Holt, R. A.	Middleton
,,	Kilvert, J. R.	Cheltenham
,,	Sullivan, K.	Liverpool
,,	Totty, E. A.	Stoke-on-Trent

Higher Grade Certificate in Gas Engineering (Manufacture) (16)

Class	Name	Town
First	Clayton, N.	Accrington
,,	Norris, D. V.	Bristol
Second	Andrews, D. M.	Enfield
,,	Atkinson, R. K.	Leeds
,,	Blears, D. K.	Harrogate
,,	Clegg, V. E.	Maidstone
,,	Deathe, P.	Wakefield
,,	Grime, K. P.	Leyland
,,	Harris, D.	Weston-super-Mare
,,	Jones, D. A.	Southampton
,,	Murray, D.	Dundee
,,	Palmer, A. H.	Godalming
,,	Preston, K. A.	Wallasey
,,	Rimmer, D. A.	Wigan
,,	Simpson, K. G.	Radlett
,,	Styles, P. A. W.	Southampton

Ordinary Grade Certificate in Gas Engineering (Manufacture) (13)

Class	Name	Town
Second	Bull, R.	Southampton
,,	Courtney, F.	Grimsby
,,	Delany, D. P.	Watford
,,	Dobbs, S.	Hull
,,	Gower, H. M.	Quedgeley
,,	Henebery, J.	St. Helens
,,	Howard, J. B.	Cottingham
,,	Leake, G. F.	Cromer
,,	Morris, G. F.	Stoke-on-Trent
,,	Palmer, A. H.	Godalming
,,	Smallridge, A. V. G.	Exeter
,,	Wade, A. L.	Ipplepen
,,	Wisewould, J. E.	Banstead

Ordinary Grade (Single Subject) Gas Engineering (Manufacture) to qualify to sit for the Diploma in Gas Engineering (Supply) (3)

Class	Name	Town
First	Atkin, R. J.	Nottingham
,,	Emmony, R. O.	Cambridge
,,	Kendall, C. R.	Leicester

Diploma in Gas Engineering (Supply) (3)

Class	Name	Town
Second	Bunker, P. J.	Woodingdean
,,	Whitney, W. E.	Middlesbrough
,,	Wilson, N. D.	Perth

ORDINARY GRADE GAS ENGINEERING (SUPPLY)
Number of candidates who sat for the Examination

Class	Internal—238		External—98		Total—336	
	No.	%	No.	%	No.	%
First with Distinction	—	—	—	—	—	—
First	24	10.1	13	13.3	37	11.0
Second	122	51.3	46	46.9	168	50.0
Fail	92	38.6	39	39.8	131	39.0

HIGHER GRADE GAS ENGINEERING (SUPPLY)
Number of candidates who sat for the Examination

Class	Internal—72		External—32		Total—104	
	No.	%	No.	%	No.	%
First with Distinction	—	—	—	—	—	—
First	3	4.2	3	9.4	6	5.8
Second	31	43.0	9	28.1	40	38.4
Fail	38	52.8	20	62.5	58	55.8

Higher Grade Certificate in Gas Engineering (Supply) (7)

Class	Name	Town
First	Craven, D.	Leeds
,,	Pratt, A. G.	Ipswich
Second	Jarrett, L. W.	Cambridge
,,	Mark-Bell, G.	Falkirk
,,	Sharp, J.	Troon
,,	Tweedle, F.	Swindon
,,	Wood, J.	New Mills

Ordinary Grade Certificate in Gas Engineering (Supply) (27)

Class	Name	Town
First	Fitch, E. R.	Sheffield
,,	Jasper, G. W.	Brighton
Second	Bartlett, R. G.	Paignton
,,	Brown, D. W.	Plymouth
,,	Challinor, R. W.	West Bromwich
,,	Fiddler, V. H.	Ashford
,,	Flather, P. G.	Southampton
,,	Guthrie, R. J.	Lower Largo
,,	Hamlyn, D. W.	Darlington
,,	Hartley, A. J.	Ludlow
,,	Hubbard, L. G.	Lowestoft
,,	Hutchings, P.	Oxford
,,	Kinder, A.	Sheffield
,,	Leeming, R.	Bolton-on-Dearne
,,	Lyons, L.	Birkenhead
,,	Marshall, W.	Hawick
,,	Mason, C. F.	Walton-le-Dale
,,	Miller, F.	Darwen
,,	Prothero, W. H.	Bedford
,,	Pugh, D. O.	Wakefield
,,	Rann, C. H.	Normanton
,,	Scrivener, C. F.	Sudbury
,,	Smith, T.	Sheffield
,,	Webber, J. W. R.	Taunton
,,	Whiteley, D.	Skegness
,,	Whiten, W. E.	Nottingham

Ordinary Grade (Single Subject) Gas Engineering (Supply) to qualify to sit for the Diploma in Gas Engineering (Manufacture) (9)

Class	Name	Town
First	Aitken, E. J.	Cambridge
,,	Alexander, E. P.	Shrewsbury
,,	Bennetts, J.	Northampton
,,	Cole, G. F.	Loughborough
,,	Faulkner, E. L.	Reading
,,	Hoyle, N.	Hollingworth
,,	Kerr, A. G.	Hamilton
,,	Robinson, H. C.	Grimsby
,,	Sharpe, R. M.	Boston

INTERNAL CANDIDATES (241)

Higher Grade Certificate in Gas Engineering (Manufacture) (47)

Class	Name	College
First	Bates, J.	Derby
,,	Bradbury, I.	Manchester
,,	Hardman, F.	Manchester
,,	Hayston, W.	Leicester
,,	Murray, J. T.	Dundee
,,	Robertshaw, G. W.	Derby
,,	Scantlebury, F. T.	Plymouth
Second	Cameron, R. W. N.	Bristol
,,	Cannon, C. S.	Westminster
,,	Carter, R. L.	Derby
,,	Charlton, D.	Newcastle-on-Tyne
,,	Duignan, D. H.	Birmingham
,,	Fuller, B. J.	Westminster
,,	Gough, G. A.	Birmingham
,,	Harvey, F. S.	Sheffield
,,	Higton, C. W.	Rotherham
,,	Hill, F. L.	Westminster
,,	Holmes, G. W. R.	Manchester
,,	Holt, A.	Huddersfield
,,	Hutchings, A. V. S.	Cardiff
,,	Jackson, A. M.	Glasgow
,,	John, J.	Cardiff
,,	Johnson, G.	Newcastle-on-Tyne
,,	Jones, E. B. R.	Manchester
,,	Lewis, J. T.	Newcastle-on-Tyne
,,	Little, L. H.	Sheffield
,,	McLeish, J. A.	Newcastle-on-Tyne

Higher Grade Certificate in Gas Engineering (Manufacture) — Continued

Class	Name	College
Second	Marsh, A.	Derby
,,	Mason, R. T.	Huddersfield
,,	Matthews, E. C.	Derby
,,	Ollerenshaw, N.	Bradford
,,	Reynolds, S. G.	Birmingham
,,	Roberts, A. S. N.	Gloucester
,,	Rogers, J. R.	Leicester
,,	Sanderson, S. A.	Edinburgh
,,	Scott, W.	Glasgow
,,	Seed, J. W.	Rotherham
,,	Shuttleworth, J.	Bradford
,,	Sidebotham, J.	Manchester
,,	Taylor, E.	Huddersfield
,,	Townsend, C. C.	Gloucester
,,	Walker, G. O.	Huddersfield
,,	Whitmill, P. A.	Leicester
,,	Williams, E. S.	Gloucester
,,	Wixey, H. P.	Gloucester
,,	Yeaman, A. G. D.	Birmingham
,,	York, E. J.	Bristol

Ordinary Grade Certificate in Gas Engineering (Manufacture) (56)

Class	Name	College
First	Atkinson, J. W.	Westminster
,,	Bailey, J. C.	Westminster
,,	Macdonald, J. C.	Edinburgh
,,	Sinnott, R. K.	Birmingham
Second	Artus, G. S.	Bradford
,,	Barnett, B. J.	Westminster
,,	Black, E. L.	Glasgow
,,	Carey, R. J.	Birmingham
,,	Carpenter, L.	Westminster
,,	Childs, H.	Westminster
,,	Clelland, G.	Glasgow
,,	Cope, D. E.	Manchester
,,	Cowan, J. M.	Manchester
,,	Drummond, I. G.	Edinburgh
,,	Dunstan, E.	Rotherham
,,	Elliott, J. K.	Manchester
,,	Exley, R.	Huddersfield
,,	Fothergill, A.	Newcastle-on-Tyne
,,	Grosse, D.	Westminster
,,	Harvey, D. W.	Plymouth
,,	Hill, D. A. S.	Plymouth
,,	Holland, J. K.	Westminster
,,	Hyde, J. V.	Westminster
,,	Laing, G. W.	Glasgow
,,	Langford, J. P. N.	Birmingham
,,	Lawson, J. A.	Birmingham
,,	Leighton, C. E.	Gloucester
,,	Long, H. E.	Westminster
,,	Lowe, E. C.	Westminster
,,	Lowe, J. H.	Edinburgh
,,	Maskelyne, R. J.	Westminster
,,	Newcombe, E.	Wigan
,,	Noble, B.	Huddersfield
,,	O'Donnell, J.	Glasgow
,,	Paine, E. A. R.	Westminster
,,	Potter, L. W.	Westminster
,,	Rashbrook, C.	Westminster
,,	Riley, P. D.	Wigan
,,	Sanderson, C. J.	Newcastle-on-Tyne
,,	Simpson, R. A.	Manchester
,,	Smart, D. T.	Westminster
,,	Stanley, P.	Manchester
,,	Starford, G. M.	Westminster
,,	Stead, F.	Huddersfield
,,	Studley, A. P.	Plymouth
,,	Taylor, A. N.	Westminster
,,	Taylor, D.	Harrogate
,,	Tennyson, C.	Birmingham
,,	Turnbull, J. S.	Newcastle-on-Tyne
,,	Walker, L.	Birmingham
,,	Walton, A.	Newcastle-on-Tyne
,,	Watson, D.	Harrogate
,,	Wilson, S. N.	Wigan
,,	Witton, L. C.	Birmingham
,,	Worrall, A. J.	Wigan
,,	Yule, J. I.	Edinburgh

Higher Grade Certificate in Gas Engineering (Supply) (27)

Class	Name	College
First	Butchart, J.	Dundee
,,	Evans, J. E.	Westminster
,,	Herbert, K.	Manchester
Second	Anderson, I. M.	Edinburgh
,,	Bird, A. H.	Westminster
,,	Brew, C. M.	Westminster
,,	Chance, P. R.	Westminster
,,	Chapman, E.	Westminster
,,	Coombes, A. J.	Westminster
,,	Davies, G. S.	Westminster
,,	Eales, R.	Westminster
,,	Forder, F. C.	Westminster
,,	Hall, T. C.	Newcastle-on-Tyne
,,	Harris, N. D.	Westminster
,,	Heaton, H. L.	Manchester
,,	Hutchings, A. V. S.	Cardiff
,,	Jordan, F. H.	Westminster
,,	Laycock, D.	Bradford
,,	Lewis, B. C.	Westminster
,,	Mitchell, W. E.	Birmingham
,,	Pope, C. J.	Cardiff
,,	Rush, F. A.	Derby
,,	Savage, A. W. F.	Birmingham
,,	Tammadge, A. A.	Brighton
,,	Westwood, F. A. G.	Cardiff
,,	Wilkes, H. E.	Westminster
,,	Windsor, H. J.	Westminster

Ordinary Grade Certificate in Gas Engineering (Supply) (109)

Class	Name	College
First	Barber, S. T.	Westminster
,,	Brown, J. M.	Dundee
,,	Carter, D. L.	Westminster
,,	Cornish, A. R. H.	Westminster
,,	Frith, A. I. D.	Southend
,,	Hall, W. H.	Westminster
,,	Lawrence, H. R.	Westminster
,,	Longley, C. H.	Liverpool
,,	Mee, W. G.	Westminster
,,	Morgan, C. G. J.	Westminster
,,	Pell, H. W.	Westminster
,,	Pritchard, H. A.	Westminster
,,	Raworth, A. C.	Tottenham
,,	Skinner, S.	Westminster
,,	Taylor, A. E.	Westminster
,,	Thompson, C. C.	Westminster
Second	Allum, R. E.	Westminster
,,	Amos, R. H. C.	Bristol
,,	Andrews, W.	Liverpool
,,	Banister, J. W.	Westminster
,,	Bawn, R. H.	Bristol
,,	Bell, E. J.	Tottenham
,,	Benson, C. W.	Westminster
,,	Berry, A. H.	Tottenham
,,	Black, E. L.	Glasgow
,,	Blaxhall, C. W.	Westminster
,,	Blears, D.	Harrogate
,,	Bleumel, G. E.	Westminster
,,	Bristeir, G. E.	Westminster
,,	Brown, G.	Harrogate
,,	Campbell, J. M.	Glasgow
,,	Chalcraft, M.	Bradford
,,	Chapman, E.	Newcastle-on-Tyne
,,	Charlton, D.	Newcastle-on-Tyne
,,	Charlton, E. K.	Manchester
,,	Clelland, G.	Glasgow
,,	Coates, A.	Tottenham
,,	Collins, F. L. G.	Westminster
,,	Cooper, E.	Birmingham
,,	Cross, W.	Liverpool
,,	Curr, S. H.	Westminster
,,	Currie, R. M.	Glasgow
,,	Dalrymple, W. C.	Glasgow
,,	Dearing, R. E.	Westminster
,,	Davies, S.	Harrogate
,,	Edwards, G. C.	Liverpool
,,	Endsor, D.	Westminster
,,	Fenn, L. J.	Westminster
,,	Fisher, J. W.	Liverpool
,,	Fitzjohn, H. R.	Tottenham
,,	Galloway, W. P.	Glasgow
,,	Goodrick, H. E.	Tottenham
,,	Gooud, S. W.	Westminster
,,	Gowans, J. M.	Newcastle-on-Tyne
,,	Hale, N. R.	Westminster
,,	Hall, H. V.	Manchester
,,	Hamilton, J.	Birmingham
,,	Hammond, D. H.	Westminster
,,	Hands, W. H.	Manchester
,,	Haselden, W.	Liverpool
,,	Hastings, A. C.	Glasgow
,,	Hayes, G. S.	Tottenham
,,	Humphreys, E. H.	Liverpool
,,	Huxter, P. W.	Southend-on-Sea
,,	Ironmonger, T.	Liverpool
,,	Kitching, D.	Westminster
,,	Kidd, E.	Manchester
,,	Lawrance, E. W. W.	Westminster
,,	Levinson, B. V.	Westminster
,,	Lindsay, R.	Newcastle-on-Tyne
,,	Look, C. G.	Birmingham
,,	Lowe, J. H.	Edinburgh
,,	McGrath, J. F.	Westminster
,,	McWilliam, J.	Glasgow
,,	Malcolm, R. E.	Bradford
,,	Malham, T. W.	Westminster
,,	Millar, C. M.	Glasgow
,,	Paterson, W. M. R.	Westminster
,,	Paton, G. S.	Westminster

Ordinary Grade Certificate in Gas Engineering (Supply — Continued

Class	Name	College
Second	Pauley, J. A. C.	Harrogate
,,	Penhey, G.	Westminster
,,	Peters, D. C.	Westminster
,,	Pettitt, A. P. D.	Tottenham
,,	Proctor, S. W.	Westminster
,,	Rendle, A. J.	Tottenham
,,	Reynolds, L. A.	Tottenham
,,	Shaw, J.	Liverpool
,,	Short, A. H.	Westminster
,,	Spence, F.	Westminster
,,	Smith, R. P.	Bradford
,,	Standen, B. R.	Westminster
,,	Stoney, R.	Coventry
,,	Surtees, H. K.	Westminster
,,	Swinson, D. J.	Tottenham
,,	Tate, D.	Bradford
,,	Toomer, D.	Westminster
,,	Tucker, S. F.	Bristol
,,	Turner, F. J. W.	Westminster
,,	Tydeman, P. G.	Tottenham
,,	Vickers, D. R.	Westminster
,,	Voce, N. T.	Harrogate
,,	Ward, P. H.	Westminster
,,	Weatherhead, R.	Middlesbrough
,,	White, G. E. T.	Tottenham
,,	White, P. D.	Westminster
,,	Williamson, T. A.	Tottenham
,,	Wilson, B.	Liverpool
,,	Wilson, W. Y.	Dundee
,,	Wright, D.	Manchester

Ordinary Grade (Single Subject) Gas Engineering (Supply) to qualify to sit for the Diploma in Gas Engineering (Manufacture) (2)

Class	Name	College
First	Arbery, W. W.	Westminster
,,	Mottershead, J. K.	Manchester

Supplemetary List

EXTERNAL CANDIDATES (16)

Higher Grade Certificate in Gas Engineering (Manufacture) (2)

Class	Name	Town
Second	Atterton, J. R.	Marske-by-Sea
,,	Chrispin, W.	Church

Ordinary Grade Certificate in Gas Engineering (Manufacture) (6)

Class	Name	Town
Second	Bevan, B.	Bristol
,,	Boulton, P. R.	Newcastle, Staffs
,,	Heslop, P. G.	Ryton
,,	Jennings, J. K.	Lower Willingdon
,,	Scott, C. R.	Southport
,,	Waite, G.	Castleford

Higher Grade Certificate in Gas Engineering (Supply) (3)

Class	Name	Town
Second	Haugh, R. J.	Liverpool
,,	Le Caudey, M. J. T.	St. Brelade
,,	Taylor, F. S.	Castleford

Ordinary Grade Certificate in Gas Engineering (Supply) (5)

Class	Name	Town
Second	Matthews, H.	Bradford
,,	Metcalfe, B. T.	Boroughbridge
,,	Small, A. H.	Hull
,,	Sunderland, P.	Halifax
,,	Taylor, H.	Wigan

INTERNAL CANDIDATES (29)

Higher Grade Certificate in Gas Engineering (Manufacture) (6)

Class	Name	College
Second	Brown, S. H.	Burnley
,,	Clayton, D. F.	Birmingham
,,	Cope, D. E.	Manchester
,,	Hall, J. A.	Burnley
,,	Hobson, R. B.	Birmingham
,,	Smethurst, L. B.	Manchester

Ordinary Grade Certificate in Gas Engineering (Manufacture) (4)

Class	Name	College
Second	Aspinall, G. M.	Manchester
,,	Carter, R. L.	Derby
,,	Savage, K. T.	Birmingham
,,	Walton, H.	Birmingham

Higher Grade Ce tificate in Gas Engineering (Supply) (5)

Class	Name	College
First	Wright, V. R.	Bradford
Second	Butchart, J.	Dundee
,,	Ling, C. H.	Newcastle-on-Tyne
,,	Milan, J. H.	East Ham
,,	Willett, A. J.	East Ham

Ordinary Grade Certificate in Gas Engineering (Supply) (14)

Class	Name	College
First	Gibb, J. A.	Newcastle-on-Tyne
,,	Rostron, M. J.	Westminster
,,	Smith, A. J. R.	Brighton
Second	Booth, R.	Burnley
,,	Gray, A. L.	Westminster
,,	Gudgion, G. W.	East Ham
,,	Hobson, A. M.	Coventry
,,	Kirby, F. R. A.	Westminster
,,	Moore, A.	Harrogate
,,	Pickett, R.	Bournemouth
,,	Sutherland, J. W.	Westminster
,,	Tulley, R. C.	East Ham
,,	Wareham, H.	Bournemouth
,,	Whittaker, W. P.	Burnley

Class	Name	Town
First	Blane, D. F.	Freshwater
,,	Smith, A. J. R.	Brighton
Second	Bashford, A. G.	Wallington
,,	Brogan, D. A.	Cambridge
,,	Caswell, E. J.	Brighton
,,	Hammond, G. L.	Brighton
,,	Hardy, A. L.	London
,,	Moore, R. W.	Southport

Northern Increases

At a private meeting of the Darlington Division Gas Consumers' Committee, Alderman J. Hoy, Chairman of the Northern Gas Consultative Council, made a statement regarding increased gas charges imposed by the Northern Gas Board. In a statement after the meeting, he said that the price adjustments would mean increases for only four of the 12 units in the Darlington Division. The increases were due to the Board's policy of levelling out prices and to increased costs of production.

The Board had estimated that its expenditure would increase by £450,000 owing to increased charges for various items, such as wages, railway charges, oil, and petrol. Economies introduced had reduced this amount to £350,000 and it had been necessary to seek increased revenue from sales.

The meeting passed a resolution appreciating the fact that the higher gas charges were due to increased costs of operating.

A Film Show

A joint meeting of the Midland Junior Gas Association with the Wolverhampton & District Engineering Society was held at Wolverhampton Gas Offices on November 20.

Three films were shown—'The Nation's Wealth' and 'Furnace Practice,' issued by the Ministry of Fuel and Power, and 'Fire Fighting.'

Mr. J. Palser (President of the Midland Junior Gas Association), welcoming the visitors from the Engineering Society, expressed the pleasure of his members in having the opportunity of meeting members of the Engineering Society. Mr. Palser also extended thanks to the West Midlands Gas Board for their hospitality.

Mr. Boyd (President of the Wolverhampton & District Engineering Society) responded.

Mr. Macnaughton (Deputy Divisional Manager of the Wolverhampton Division of the West Midlands Gas Board and President of the Association and of the Society) acknowledged the appreciation of the two organisations on behalf of the West Midlands Gas Board.

An Architect's Views on the

STORAGE AND DELIVERY OF SOLID FUEL*

By JOHN PINCKHEARD, A.R.I.B.A.

THE fuel store is one of the humblest components in a building, but failure to cope satisfactorily with it in the design stage is liable to result in its becoming annoyingly obtrusive afterwards. It will be appropriate in this talk, notwithstanding the reference in the title to solid fuel, to confine my remarks to coke—the fuel with which your Association is particularly concerned. The chemical and physical properties of the fuel have a definite bearing on the method of storage and the design of the storage accommodation. As is well known, bituminous coal, when stored in large stacks, is liable to 'heat up' and be susceptible to spontaneous combustion. Coke is free from these disadvantages and can be stored in virtually any quantity and to considerable heights.

The object of fuel storage is to provide a reserve which will enable heating installations to continue working over reasonable periods without the necessity of frequent small deliveries. Apart from holiday periods fuel production throughout the year is fairly constant. Consumption, however, is subject to seasonal variation, and during the coldest period of the year, from January to March, the rate of consumption normally exceeds production. The difficulty of bridging the gap between varying rates of production and consumption can be largely overcome if the consumers' demand is consistent throughout the year instead of rising to a peak during the winter months. The demand for solid fuel deliveries during the cold period may also impose a severe strain on the merchants' organisation. It is desirable, therefore, that adequate storage accommodation should be provided by consumers so that fuel stocks can be accumulated during the summer to ensure supplies for the winter, and to alleviate the problem of delivery during this period.

For the purposes of this talk it will be convenient to divide buildings into three groups:

First—houses and flats having individual fuel stores.

Second—medium-sized buildings with central heating installations; centralised fuel storage arrangements such as schools, offices, hospitals, public buildings, some industrial buildings, and centrally-heated flats.

Third—large industrial buildings and such buildings as power stations where the magnitude of the problem of fuel storage and handling is sufficient to justify the employment of specialist consultants to deal with this aspect, and which must be considered outside the scope of this paper.

Domestic Fuel Stoves

There are various official and semi-official recommendations as to the amount of storage space which should be provided in domestic fuel stores. It was, for example, recommended in Post-war Building Study No. 10[1] that all urban houses should have storage capacity for 1½ tons, and rural houses two tons. This would, in fact, provide at least twelve weeks' storage. In practice, there has been a tendency to scale down these requirements. The latest edition of the Housing Manual[2] suggests that for urban houses having one solid fuel appliance on the ground floor there should be a minimum of 12 sq. ft. of storage space; with two appliances this should be increased to 20 sq. ft., suitably sub-divided if two different fuels are used. For rural houses the minimum should be increased to 20 sq. ft. even if only one appliance is installed.

With regard to flats, the published recommendations are generally rather vague. The Housing Manual states only that storage should be 'adequate.' In a pamphlet published by the C.U.J.C.[3] it was suggested that for flats a minimum of four weeks' storage should be provided. Assuming an open fire consuming coke at 1½ cwt. a week this would mean a fuel store with floor area of 6 sq. ft. and a total capacity of 24 cu.ft. In the case of a multi-duty appliance consuming 2½ cwt. per week, 10 sq. ft. of floor area and a capacity of 40 cu.ft. would be necessary. It may be noted that in regard to small domestic boiler installations the recently-published Code of Practice[4] advocates a minimum storage period of three weeks but with capacity for not less than ¾ ton of coke.

Fuel stores for ordinary two-storey houses are generally incorporated with the out-buildings at the rear, and there is normally very little difficulty in complying with the space requirements suggested above. Access from the back door of the house should be under cover and the ground paved. The store should have head room of not less than 6 ft. 3 in. Coal boards should be provided to make the maximum use of the space, and these should be designed to allow the fuel to be conveniently picked up from an opening at the bottom. Details of this design are contained in the pamphlet published by the C.U.J.C.[5] The coal boards should not extend to a greater height than 4 ft. from the floor; otherwise it becomes difficult for the coalman to make deliveries.

The store should be sited at a convenient distance from the road so as to eliminate long 'carries' for the coalman. The Code of Practice referred to earlier suggests a maximum of 30 yd., and this agrees with the practice of many local authorities who work to a maximum of 80 ft.

The provision of individual fuel stores in flats is a much more difficult problem and one of which it is doubtful if there is any ideal solution. There are three common ways in which fuel store can be arranged in relation to the flat—within the flat itself, immediately outside the flat on a balcony or landing, and in a separate store at ground floor or basement level. The store within the flat has one advantage in that it is always under the eye of the tenant; but it is an arrangement likely to cause dirt and mess and necessarily involves the delivery man entering the flat in order to make deliveries. The store immediately outside the flat is a better arrangement and can often be conveniently arranged on the landing adjacent to the front door. Arrangements must be made for locking the store, both the access hatch for delivery and also the separate opening for withdrawals. There is a quite successful compromise arrangement where the store is situated within the flat but has an access hatch so placed that deliveries can be made from outside.

Delivery hatches or hoppers should not be less than 2 ft. 6 in. square, with the bottom edge approximately 4 ft. from the ground. Stores provided at the ground floor afford the maximum convenience for the delivery man and the maximum inconvenience to the upper floor tenants. It is, however, nearly always possible to provide a more capacious store in this way, whereas pressure of space within the flat tends to cramp internal fuel stores.

It is not usually practicable to have individual fuel stores adjacent to flats in blocks which are higher than three storeys unless a lift or hoist is provided to raise the fuel to the upper level. Flats having five floors or more are now provided with passenger lifts in accordance with recommendations of the Housing Manual and do not present any serious problems

* Paper to the London and Counties Coke Sales Circle, November 15, 1950.

from the point of view of fuel delivery. Four-storey flats are difficult because they are below the limit of passenger lifts but above the three-storey limit which is generally regarded as the maximum height to which the delivery man can be expected to carry. It is the practice of the L.C.C. and some other housing authorities to provide fuel hoists for four-storey flats. This does not apply in the case of four-storey maisonettes where, of course, fuel does not need to be delivered higher than the third floor.

Fuel stores should be constructed with walls of brick or concrete or other materials of equal durability. Timber and galvanised steel sheet are not suitable materials.

Larger Buildings

In general it may be said that a minimum amount of storge equal to four weeks' peak load requirements should be the aim in all new buildings. In the case of factories this figure should be increased if possible to six weeks. It is frequently possible, for example, in buildings on open sites to provide accommodation considerably in excess of these figures; on the other hand, in buildings in very densely built-up areas, with high site values, it may be very difficult always to satisfy the suggested minimum.

In all central heating installations, irrespective of site conditions, some storage should be planned either as part of, or immediately adjacent to, the boiler room. In the majority of buildings this storage may most conveniently be planned under cover though protection from the weather is not in itself of great importance except when hand-firing is in operation. In this case part at least of the storage accommodation should be planned so as to obviate the need for the stokers constantly to alternate their activities between the heated boiler-room and an out-door fuel store.

In building on open sites the lay-out of the fuel store and boiler-room tend to conform to a horizontal pattern with fuel and plant spread out at ground level; in urban buildings, pressure of space more often favours a vertical arrangement with fuel storage and boiler plant at different levels.

Out-Door Storage

Where space is available open air storage is, of course, the most economical arrangement. It is true that exposure to the rain results in an increase in moisture content, but the small loss of calorific value on this account is not usually considered serious enough to justify the cost of providing overhead cover.

Where solid fuel is deposited directly on the ground considerable waste may occur due to the fuel at the base of the stack mingling with the earth and not being picked up again when the site is cleared. These so-called "carpet losses' are progressive and occur each time a fresh load is discharged on to an area which has been cleared. A layer of ashes or brick rubble well consolidated is a great improvement over a bare earth floor, but the best method is to have a concrete slab which enables the fuel to be picked up cleanly and with less effort entirely eliminates carpet loss. The slab should be strong enough to support lorries and laid to a slight fall for drainage.

When a tipping lorry discharges its load on the ground it deposits a roughly conical heap from 3 ft. 6 in. to 4 ft. 6 in. high. In practice, where there is no mechanical handling equipment and where labour is not available for manual handling, the height of the stack is limited by the height of the heap which the lorry deposits. Also, unless very careful supervision is exercised the whole area available for storage becomes scattered with small heaps of fuel discharged more or less indiscriminately by the drivers of delivery vehicles. In this way very poor use is made of the storage area and also it is extremely difficult to assess the quantity of fuel held in stock.

A simple way of overcoming these difficulties and of exploiting the advantages of the tipping lorry is to sub-divide the storage area into bays by a series of low retaining walls. Storage bays of this type are described in Ministry of Fuel and Power Pamphlet 'The Handling and Storage of Coal.' The walls should be approximately 5 ft. high and spaced about 10 ft. apart to allow lorries to back in. The spread of each successive tipped heap is confined to the width of the bay and as each load is deposited the bay is compactly filled to a height of 4 ft. to 4 ft. 6 in. Manual handling is practically unnecessary as with proper supervision the bays are virtually self-trimming. It becomes a simple matter to assess the quantity of fuel held in stock, and height lines marked at vertical intervals of 1 ft. round the bays are useful for this purpose.

The outside fuel store should, of course, be planned conveniently in relation to the boiler house, and differences of level on the site should be taken account of in the planning so as to ease the labour of barrowing.

Storage Within Buildings

The planning of fuel storage within buildings, particularly in densely built-up areas, is usually a much more involved problem. The factors affecting the design are so diverse that it is not possible to do more than suggest certain main objectives. These are:

First—suitable access for deliveries.

Second—minimum resort to manual handling.

Third—the maximum use of the available storage space.

The desirability of bulk delivery in the interests of speed, cheapness, and economy in man-power cannot be over-emphasised. All new buildings of sufficient size to justify bulk delivery should have suitable facilities provided for this purpose. Access roads for lorries should have a minimum width of 10 ft. 6 in. with adequate space for turning and backing. On sharp turns the road width should be increased to 14 ft. The minimum turning radius for the largest commercial vehicles in general use is 36 ft. and for the popular 5-ton short wheel-base tipper is from 18 ft. to 22 ft. The latter is not however a very suitable vehicle for coke transport.

In almost all existing large towns, particularly in the central areas, access for delivery of fuel—and, indeed, of all other goods—is an acute problem. The familiar urban scene in which all the frontages are built-up has arisen due to the development of land in small units and the desire of each separate developer to have street frontage. The aggregate effect of this has been to produce round the perimeter of each island site a dense ring of buildings enclosing an internal area or courtyard often inaccessible from the street. Access to fuel storage in such areas is normally through coal plates in the pavement, but very few of these are so situated as to permit bulk deliveries direct from tip lorries.

It was partly to meet the difficulty of discharging fuel into cellar openings that the mobile belt conveyor was developed in the United States as part of the equipment of the delivery lorry. The introduction of a vehicle so equipped by the merchants of this country could do much to simplify deliveries to existing buildings and would also, by reducing the standing time of the vehicle, help to relieve traffic congestion.

The need for considerable man-handling after the fuel has been delivered can often be avoided by careful planning. An ideal arrangement, but only possible in buildings with deep basements, is to have the fuel bunkers at basement level (filled from pavement openings) and discharging directly to the boilers at sub-basement level. Differences in level in the site can also sometimes be exploited to ensure the movement of fuel by gravity instead of by man-power.

Fuel Delivery

It has already been mentioned that the method of delivery has a considerable bearing on the design of the fuel storage arrangements. In the past the great proportion of fuel delivered by the merchants has been in sacks, and so far as the domestic user is concerned, there is unlikely to be any change in this method so long as deliveries have to be made to individual fuel stores. There are, however, very few non-residential buildings where the quantity of fuel used and stored

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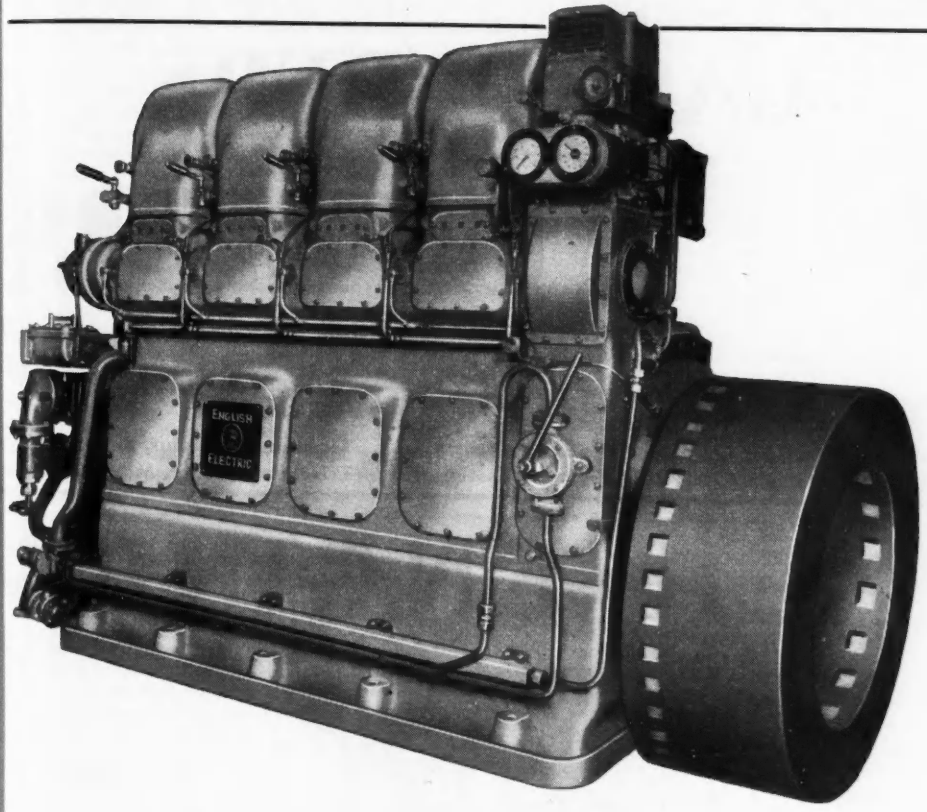

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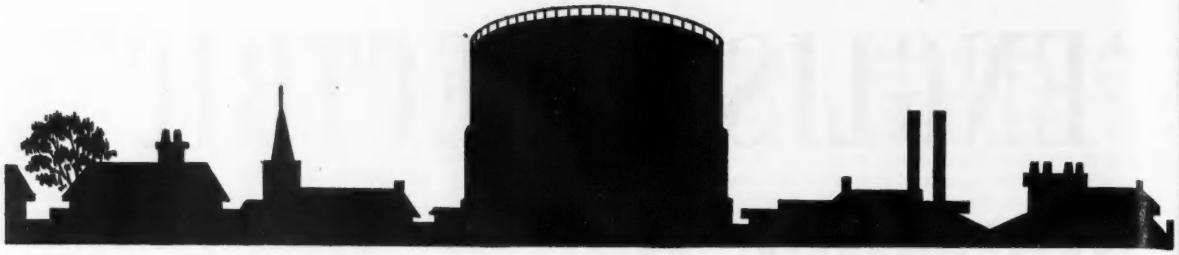

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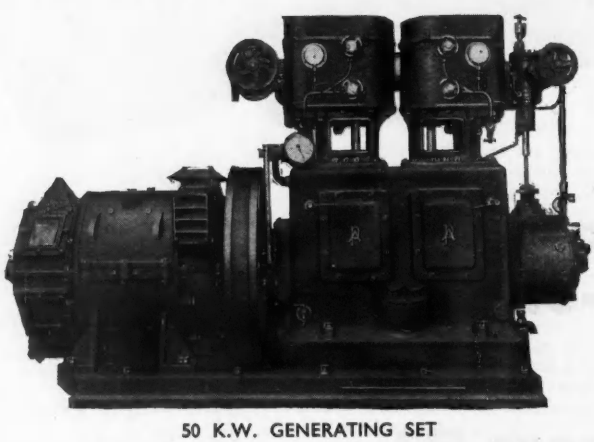

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would not justify the adoption of bulk delivery. The type of vehicle most used for bulk solid fuel deliveries is the end-tipping lorry. The transport of coke, however, affords a special problem on account of its bulk. The 5-ton short-wheel-base tipper, which is very suitable for coal deliveries is not a good vehicle for carrying coke, as no reasonable increase in the height of the sides can possibly provide the capacity necessary for a full pay-load. It is for this reason that bulk coke deliveries are more economically transported by the long wheel-base lorry. Lorries of this type, however, when equipped with tipping bodies require greater headroom —a point of considerable importance in the design of a building if it is intended that the lorries should unload within the building or within the shelter of a covered loading bay.

A specialised type of vehicle which has been used to a limited extent is the rolling-floor lorry. The floor is in the form of an endless band of tough rubber passing over rollers which can be rotated so as to eject the contents from the rear of the lorry. Although this vehicle has so far only rarely been employed, it has advantages over the tipper in that it can operate within a much lower headroom and is better suited to delivering into vertical openings.

Normally, fuel if required to a greater height than 4 ft. 6 in. must be shifted by hand or, alternatively, some form of mechanical stacking equipment employed. Specialised elevating and end-tipping vehicles have been developed which enable fuel to be discharged and stacked to a much higher level than is possible with an ordinary tipper, and make possible an increase of some 50% in the storage capacity of a given site. In the United States a widely-used type of vehicle is the tipper, supplemented by a light elevator conveyor carried as part of the vehicle equipment and operated hydraulically from the engine. The great advantage of this type of equipment, which is now also being produced in this country, is that deliveries can be made without manual intervention to points well beyond the reach of an ordinary tipper. Fuel can be discharged within an appreciable horizontal radius from the rear of the lorry and by angling the conveyor into openings at sill height in vertical walls.

1. Post-war Building Studies, No. 10, Solid Fuel Installations. Ministry of Works, H.M.S.O. 1944.
2. Housing Manual, 1949. Ministry of Health, H.M.S.O.
3. The Storage of Solid Fuel in Local Authority Flats. C.U.J.C.
4. British Standard Code of Practice C.P. 342 (1950). Centralised Domestic Hot Water Supply.
5. Fuel Stores for Small Houses. C.U.J.C. 1947.
6. Fuel Efficiency Bulletin, No. 49. Ministry of Fuel and Power, 1947.

DISCUSSION

The **Chairman** (Mr. W. E. Daniel), opening the discussion, said he could not altogether accept what the author had said about the storage of coke out of doors; excess moisture in any fuel was undesirable and lowered the efficiency of combustion. He asked what was the legal aspect of running a conveyor across the pavement.

In the course of a general discussion which followed, attention was drawn to the difficulties experienced in getting delivery lorries up to villa and 'terrace' type properties served by communal back entries, which householders sometimes regarded as private roadways and resented their use by heavy vehicles. It was stressed that storage and price were closely linked together, and they must decide on the economics of the matter. They must distinguish very clearly between commercial and domestic users. Domestic appliances might consume up to 1½ cwt. of coke per week during the winter months, so that if six weeks' supply was taken as a reasonable figure they were going to require 50 cu.ft. of storage space. In many modern flats the floor space devoted to fuel storage was 6 sq. ft., in which case they would have to use the whole of the available height to provide the necessary storage—which was practically impossible. In the old days the right place for the fuel was in the cellar, and the right place for the cellar was under the house, where the fuel could conveniently be delivered through traps at pavement level. It was suggested that the landlords of modern blocks of flats might supply coke in bulk and include it in the rent.

A further suggestion for big blocks of flats was to put the coke in hoppers on the roof and feed each flat by a system of trunking. Alternatively, that each individual flat should have its self-contained storage space fed by a gravity chute from the floor immediately above.

Mr. **Pinckheard,** replying to the discussion, said that he did not know the legal position as regards carrying a conveyor across the pavement. He could say, however, that while the police were strongly opposed in principle to anything which obstructed the pavement and caused pedestrians to make a detour into the road, they were greatly in favour of anything which would lessen the time delivery vehicles had to stand in the roadway. He was not in favour of solid fuel being included in the rent, and he was not sure that many of the member undertakings represented at that meeting would welcome local authorities entering the market as fuel traders.

In multi-storey flats service lifts were provided which did much to assist the fuel delivery problem. He did not think the bulk storage hopper on the roof was a practical proposition; but he was very struck with the idea of delivering into individual storage by means of a chute from the floor immediately above.

Inauguration of Cardiff's New Compressor

MARKING a new stage in the bulk supply between Cardiff and Newport over a distance of 12 miles, a £5.000 electrically-driven compressor was officially set in motion on November 16 by the Chairman of the Wales Gas Board, Mr. T. Mervyn Jones, at the Cardiff undertaking's new compressor house. Also present at the opening ceremony were members of the Board and Mr. J. F. Rust (General Manager and Engineer, Newport) and Mr. F. Boardman (Engineer and Manager, Cardiff).

Four years ago the Cardiff undertaking entered into negotiations with Guest, Keen, and Baldwins, Ltd. (Cardiff), to secure a large quantity of coke oven gas. Within two years a 12 in. high pressure main was laid and an agreement completed for Newport to take a portion of the gas. With the aid of the then existing compressor plant Newport was taking 1 mill. cu.ft. a day in 1948 which increased to a daily average of 1.5 mill. cu.ft. last year.

Further domestic and industrial calls have led to this latest project. Newport undertaking estimated that by the end of this year it would have sent out 1,500 mill. cu.ft. for town supply, about 30% of which would have been acquired from Cardiff. Illustrating Newport's increasing demands is the fact that in 1949 town consumption was 1,413 mill. cu.ft. compared with 295 mill. cu.ft. in 1938.

Commenting on the new installation, Mr. Rust said that in order to take the further additional supplies of gas a 2 mill. cu.ft. holder is now being erected at Mendalgrief, Newport. He expected this holder to be completed in about two years.

The Cardiff compressor, in a 50 sq.ft. room, is of the Waller vertical reciprocating type. It is driven by a Metropolitan Vickers dynamo (417/240 r.p.m.). The compressor has a rated capacity of 100,000 cu.ft. per hour, but during the three weeks prior to its official opening it was doing 2,500,000 cu.ft. a day and on one day exceeded this by 100,000 cu.ft.

After setting the compressor in motion, the Chairman made a presentation to Mr. G. W. Randall, Cardiff showroom salesman, on completion of 50 years in the service of the undertaking. Mr. Jones praised the efforts that Mr. Randall had made to qualify himself in various aspects of the industry, setting an example to others. He joined the undertaking as fitter's apprentice and in two years was transferred to the inspector's office as assistant inspector. Four years later he became inspector in charge of a sub-district. In 1924 he was appointed inspector and salesman in the central district.

Sales and Publicity*

By R. J. GREGG,

Publicity Manager, Gas Council.

EVERY successful commercial enterprise accepts salesmanship as a serious factor, embracing the subjects of sales organisation and control. Practical salesmanship begins and ends with courtesy, and although the product itself may represent a high standard of quality, the final measure of the salesman's success largely depends upon the personal relationship he establishes with the consumer.

My personal concern is with publicity, but I am compelled to relate it to sales and, furthermore, it is necessary to examine the latter before attempting to consider the former. It is pointless to speak of publicity until the sales requirements are first made clear, for all your advertising becomes a wasted effort unless the selling machinery is there to profit from the advertising investment. But when we speak of sales we do so in order to review a potential market which you cannot possibly assess without knowing the existing degree of saturation. It is debatable whether any reliable consumer analysis exists in the industry to-day in a form which clearly indicates those appliances already installed with the date of installation and other relevant issues concerned with gas, electricity, water, and solid fuel supplies. If it is proposed to undertake a water-heating campaign by means of direct mailing, posters, film 'flashes', exhibitions, Press publicity, displays, etc., culminating in a personal house-to-house canvass, it may well be that 50% of such an effort will be wasted in the event, since a sales representative could contact a consumer only to learn that he is already equipped and—to make matters worse—the appliance is badly in need of service. All these problems give birth to minor problems and they will continue to do so until the salesman can have ready access to a consumer analysis which immediately defines his potential markets for any given appliance.

First Things First

On a basis of 'first things first', therefore, we shall perhaps be well advised to tackle the potential market forthwith, at the same time formulating sensible plans to provide a co-ordinated consumer analysis against the day when it will be desperately needed. Alternatively, how is it possible to establish the value of a sales force or to relate individual and collective effort in terms of commission on sales of appliances or increased gas consumption? I do not think that any salesman will be content until he is in possession of a complete market breakdown of the area for which he is responsible, so that he knows, without any possibility of doubt, precisely the form expansion should take.

In the meantime, it is obvious that any form of publicity must be partially wasted since all the efforts expended on Press publicity, direct mailing, showroom displays, literature, can be misapplied to consumers who are already up to date with gas.

National publicity involves both direct and indirect methods as demonstrated by Press publicity, films, exhibitions, publications, and so forth. While all these media are provided by the Gas Council, their successful application is solely dependent on the use made of them by the gas industry generally. Six hundred films are distributed by the Council every month, ensuring an audience of at least 2 mill. annually, comprising schools, institutes, technological colleges, women's organisations, national bodies, and various adult audiences, but this project alone has a potential expansion to 20,000 films per annum. Professional publications are possibly one of the best investments so far as effective media are concerned but here again the objective must be fully comprehended if the distribution is to be successful. There is no point in producing a publication dedicated to, for instance, the architectural profession if the net result approximates to 1,000 copies within 12 months. The broad potential here is in the region of 14,000 and the distribution should be made promptly since most publications quickly become dated, and the aspects of cost and waste are much affected when uneconomic quantities are ordered in the first instance.

Fundamental Issues

These are the fundamental issues to which we must pay due attention if only out of deference to the strong and virile competition we may expect from our competitor in the very near future. Where sales and publicity are concerned, it is only necessary to emphasise that the relationship between national and local publicity must be sensibly co-ordinated and, furthermore, that this applies equally to neighbouring area boards. It is not desirable, for instance, that a cooker campaign promoted through the local Press by one area or division should tell a different story from that publicised by another, unless you wish further to confound an already confused consumer.

On the national level, we are primarily concerned with four aspects of publicity:—Press advertising, exhibitions, films, and publications.

At the moment, and until a general indication for a full national Press campaign is provided, we are confined to prestige representation in the women's journals plus a somewhat wider technical Press. Newspaper publicity is temporarily directed through the leading Sunday newspapers since they provide a maximum distribution at an economic overall cost. Naturally, the various layouts involved can be alternated to support area board campaigns of a specific nature. All copy and layouts tend towards a gas prestige approach and are intended to register that gas is best for various industrial and domestic purposes, without being specific in respect of precise appliances.

In regard to exhibitions, the national programme is fully occupied in this respect, the objective being to achieve a high standard of aesthetic decorum while retaining a full sales outlook. That is to cram overmuch in a nutshell, of course, but there are some main principles which it will pay us to examine. First define your theme and then concentrate upon selection of position, which is all-important in the initial stage, bearing in mind that exhibits which are not fully operative immediately decrease the value of the stand considerably. It is dangerous to attempt to design a stand purely on a basis of appliances exhibited, for the structural and aesthetic appeal must receive first consideration. Any well-meaning attempt to cram a limited space with a multiplicity of appliances has the same result as would an overcrowded Press layout, and can only confuse the onlooker and destroy the visual presentation, individually and collectively. Trade exhibitions differ markedly from those directed at the consumer, as evidenced by the Ideal Home Exhibition and the British Industries Fair, the difference lying between professional and public appeal. Consumer stands should be designed with the accent on novelty but both types are greatly assisted by the introduction of 'eye-catchers' in the form of moving or working exhibits. All these considerations really form the fundamental basis on which the final evaluation of the total investment is best calculated, since it is incorrect to do so purely on the principle of enquiries received. It is the effective presence of gas—nationally and locally—which always counts and you need only ask one question before making a decision to take space:—'Can we afford to keep out?'

For many years past the industry has been slowly developing the use of films and ancillary visual aids of this kind. That there is room for tremendous expansion is certain and the national film programme takes this important aspect into full account. There are a number of projectors of various vintages in use within the industry today, but it is reasonable to suggest that the total objective should be a set of twin projectors to every 250,000 consumers if the full benefits of this form of publicity are to be secured.

The younger generation, particularly, are eager for this form of educational instruction and, let it be remembered,

* From a talk to the Yorkshire Junior Gas Association, November, 17, 1950.

they are the future owners of the gas industry as distinct from the effective part they may play in the recruitment of personnel in the year which lie ahead. There are 50,000 schools of various kinds in this country and a great deal remains to be done if we hope to profit from this tremendous visual potential which lies ready at hand. The present distributive service covers an annual audience of 2 mill. but the production of new films by the Gas Council should provide for an annual distribution of films to an annual audience of 5 mill.

A Golden Investment

This project, however, cannot be achieved without the full co-operation of the gas industry, coupled with a realisation of the golden investment it represents. We have yet to take full advantage of an immense adult audience who are definitely interested in gas industry films as distinct from the requirements of the habitual cinema-goers.

Documentary and purely educational films are assured of a wide field of application and the industry has sponsored many such films in the past and will continue to do so in the future. But I would also submit that we have a very real need for sales films in our approach to the soulless problem of household drudgery. While the essence of effective education is to make it interesting so also should there be a little laughter and a little learning when we film the familiar aspects of cooking, cleaning, home-laundry, and so forth.

Let us now discuss that most profitable aspect of publicity which, relatively speaking, ensures and safeguards the future of gas more, possibly, than any other form of publicity. The production of a professional publication addressed to the architectural profession, as a case in point, is one requiring the unremitting and devoted energies of experts. It is true to say that there are many examples which have necessitated as much as four years' preparatory work, all of which is completely admissible if the project itself is comprehended in the first instance and its objective thereafter completely assured.

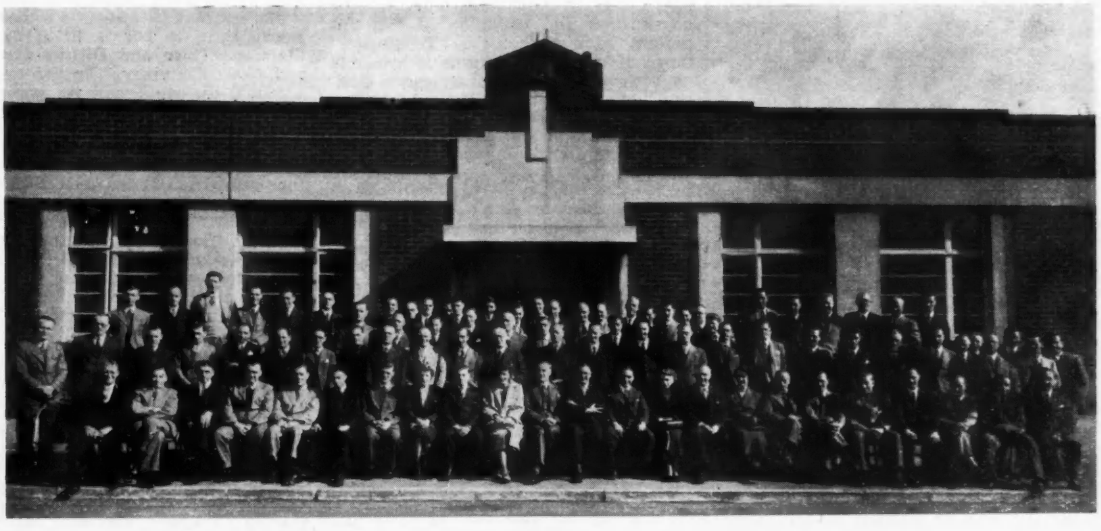
In the past, the gas industry has been provided with publications the excellence of which is beyond dispute, but the subsequent distribution has hardly justified the original objective. Here we observe the implications of wastage, for whereas a given volume for which the potential distribution amounted to 30,000 only achieved, in the event, the negligible quantity of 1,000, with the result that the production costs were excessive and the message lost. No successful commercial concern—and there are many whose success has been founded on professional publications alone—would ever attempt to engage on such a production without first being assured of subsequent distribution. The problem must be approached in a realistic manner and the full commercial aspects appreciated, so that if it is decided to produce a brochure of interest to, for instance, 26,000 bakers in the country, the plan should be progressed thenceforward on that total assumption and not on one of distribution in 'penny numbers,' for you must first evaluate the project and then positively guarantee its success, otherwise there is no point in proceeding at all.

Much Yet to Do

We have much yet to do to ensure successful presentation of the national gas shop-window, and our immediate energies can sensibly be devoted to establishing an essential facade for gas.

It has been said that we can sell all the gas we make but surely the long-term view demands that we shall be able to sell all the gas we shall make. The industry can only prosper if it demonstrates a vigorous and imaginative spirit to the public and none of that stodgy complacency which many suppose to infect most national monopolies. The whole future of the industry, its stability and progressive expansion, and the security of every gas employee are inseparable from a public impression of friendly personal service as exemplified by a virile sales organisation plus superlative publicity. Our industry represents an enormous and constantly increasing national capital investment, and a continuous campaign to secure and maintain public goodwill is a measure of protection of that investment.

EAST SURREY SALESMEN VISIT MAIN'S WORKS



THE Salesmen's Discussion Group of the East Surrey Division of the South Eastern Gas Board visited the works of R. & A. Main, Ltd., at Edmonton on September 20 and 21, under their Chairman, Mr. E. Wulstan Atkins, Divisional Sales and Service Manager. They were welcomed by Mr. MacLeod and Mr. Youens and were shown round in small groups by members of the staff who explained the various processes in the manufacture of 'Main' cookers. Members were particularly interested in the mechanical foundry and the various aspects of vitreous enamelling. The above photograph shows one of the parties which made the visit with some members of the staff of R. & A. Main, Ltd.

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METAL-TO-METAL JOINTING MATERIAL

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints in Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil, benzol, ammonia, etc.—screw pipe or flange.

Instant full pressure when the joint is made

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Trade and Company News

A film show and talk were given by **Winn & Coales, Ltd.,** on October 30 in the lecture room of the Oswestry gas showrooms. The films illustrated various applications of 'Denso' anti-corrosive and water-proofing products and was supported by exhibits of various kinds of pipe joints protected with 'Denso' plast and 'Denso' tape. A series of photographs showing the use of 'Denso' products on wind-and-water line of gas-holders, bridges, structural steelwork, large diameter mains, railway wagons, street lamps, etc., were exhibited, together with a practical demonstration of the 'Denso' portable wrapping machine. A large attendance of representatives from Oswestry and Ellesmere districts of the West Midlands Gas Board, the Wrexham undertaking of the Wales Gas Board, Oswestry R.D.C., the Wrexham and East Denbighshire Water Co., and Messrs. C. E. Williams & Co., were present.

A new series of electric proportioning valves and controls of all-British manufacture is announced by the **British Thermostat Co., Ltd.** This series provides fully proportioning control of valves, dampers, motors, etc., in direct relation to changes in temperature, pressure, or humidity. All electric in operation, the power unit being connected to the controller by one three-core cable only, this system overcomes the limitations of self-contained and pneumatic systems and offers considerable scope for installation and layout. The ease of installation and the adaptability of these controllers will appeal particularly to all concerned with the automatic regulation of industrial proceses, air conditioning, heating, and ventilation. A full description of the construction and operation of this important addition to the 'Teddington' range of automatic controls is available on application to the Commercial Division of the British Thermostat Co., Ltd., who also offer full technical advice on the selection and installation of this equipment.

Davey, Paxman & Co., Ltd., in their new publication on boilers (No. 1259) describe at length the 'Economic' boiler, the 'Ultranomic' and the 'All-Steel Sectional.' Throughout, the brochure is profusely illustrated with drawings and photographs and is relieved with colour. Its closing pages deal with technical data and sizes and capacities, all most readable and comprehensive. Their publication No. 1245 is entitled 'Colchester and Davey Paxman & Co., Ltd.,' and stresses the link between the two, especially suitable as so many Colcestrians are employed by this great works.

Designed for rigorous industrial use and mechanical dependability—yet easily carried by one man—Aerex portable blowers provide an instantly available means of air supply for cooling and for dispersal of fumes and heat in confined working spaces. They are non-overloading, and the electric motors are totally enclosed. Air-heaters can be additionally supplied for special requirements. These blowers are made by **O. N. Beck,** of 30, West End Lane, N.W.6.

Sidney Flavel & Co., Ltd.

The 47th annual general meeting of Sidney Flavel & Co., Ltd., was held on November 21 at Leamington Spa, Mr. W. A. Jackson (the chairman) presiding. The following statement by the chairman was circulated with the report and accounts for the seven months ended July 31, 1950: The results disclosed in the statement of accounts reflect a very satisfactory achievement. Our relations with the gas industry continue to be excellent. The nationalised industry has assumed its functions in an efficient and orderly manner, and, in the majority of areas, policies have already been introduced which should lead to increased sales of gas and gas appliances. An important feature of these policies is the supply to the housewife of a modern cooker at moderate cost. Your company is fortunate in having in production two new cooking appliances for the service of the Area Boards in support of their campaign. It is your company's intention to support the Gas Boards with all its resources and to spare no effort to ensure that its appliances are manufactured at a reasonable cost and in sufficient quantity. The profit earned in this period is substantially in excess of that earned for the year 1949. Your Board is pleased to recommend a dividend of 8½% (equivalent to 15% for a full year) and a bonus of 1½%. The company enjoys a very substantial order book. Current trading continues to be satisfactory and, subject to materials being available, I am confident the present position can be maintained.

Cape Town Debenture Issue

An issue of £300,000 5% debenture stock, 1970, at par is being made by the Cape Town and District Gas Light and Coke Company. To the extent of £250,000 the stock will be available to holders of the £150,000 of 4½% and £100,000 of 5% debentures due for repayment on December 31 next. The balance of £50,000 is being subscribed for cash by an underwriter. For six weeks from the date of issue the stock can be transferred to a South African register. Any such transfer is final although any transferred stock will retain its London quotation.

Calor Gas Holding Co., Ltd.

The directors of Calor Gas Holding Co., Ltd., announce a net profit before taxation for year to July 31 of £249.778 against £196,384 for the preceding year. Deferred repairs less relevant taxation £9,602 (£4,824); taxation after adjusting for income tax on initial allowances carried forward £160,609 (£121,239), leaving £79,567 (£70,321, of which £27,358 related to period prior to acquisition of shares by holding company); brought forward £13,904 (nil); general reserve £25,000 (nil); leaving £68,471 available for distribution (£42,963 for 7¼ months to July 31, 1949). The directors recommend a final dividend of 20%, making with interim dividend paid on May 15 32½% for the year, £53,996 net (18% for 7¼ months to July 31, 1949, £29,059 net), leaving £14,475 to be carried forward (£13,904).

The story of Balfour is the story of British Gas . . .

When Britain's first Gas Company was established in 1812 in Pall Mall — the first thoroughfare to be lit by gas — Henry Balfour & Co. Ltd., Gas Engineers and Ironfounders, had already been in existence for two years. It is no wonder, then, that many of the achievements of the British Gas Industry are achievements of the Balfour Organisation, too, for development has taken place side by side.

Thus it is today that the Balfour Organisation can offer an unparalleled service for planning, manufacturing and installing complete plant for the production and purification of gas, and for the recovery of by-products. Installations in most countries of the world testify to the breadth of experience that belongs to the Company as a whole. With this cumulative knowledge to support their own experience the Company's engineers are confident of dealing successfully with any problem of gas engineering technique that can be put before them.

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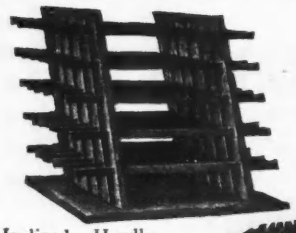

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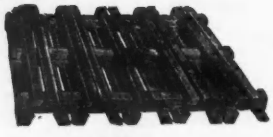

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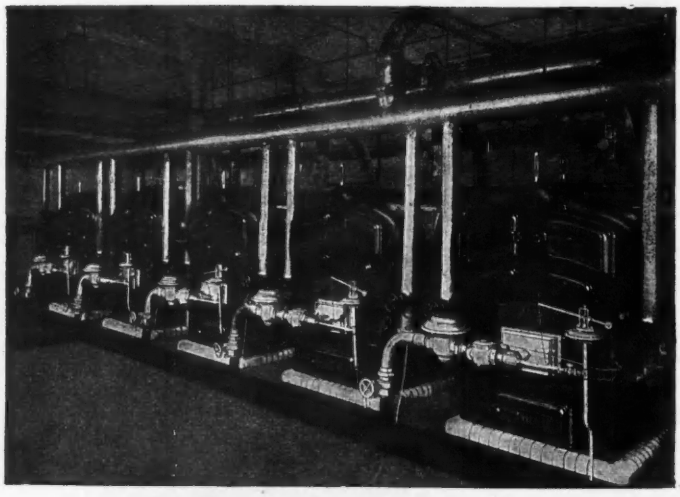

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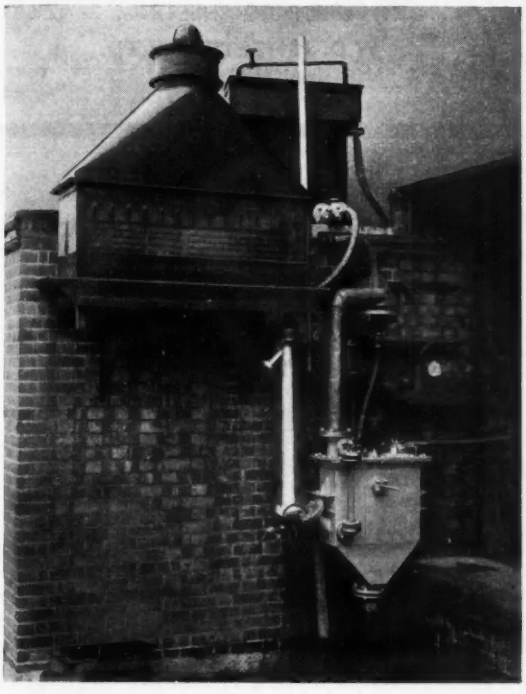

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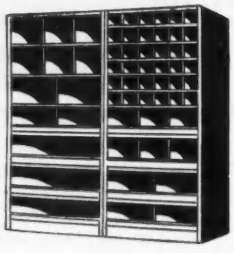

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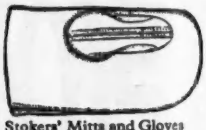

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PUBLISHERS' NOTICE

The "Gas Journal" is published every Wednesday, price 1/-; by post 1/2d.

NEW SUBSCRIPTION and CLASSIFIED ADVERTISEMENT RATES OPERATING FROM JAN. 1, 1951.

Subscription Rates: Home and Empire :- 52/- per annum; Foreign :- 60/- per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words) - minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep x 7" wide; block screen 120.

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MIDLANDS OFFICE: 10, Union Street, Birmingham.

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CONTRACTS OPEN

WEST MIDLANDS GAS BOARD

DUDLEY DISTRICT
GASHOLDER TANK.

TENDERS are invited for the work of preparing the site and constructing a SUNKEN REINFORCED CONCRETE GASHOLDER TANK, at the Board's Gasholder Station, Dawley Brook, Kingswinford, Staffordshire.

Bill of Quantities and form of Tender can be obtained on written application to the undersigned before Saturday, December 16, 1950, enclosing a deposit of two guineas, which will be returned on receipt of a bona fide tender not subsequently withdrawn.

Sealed tenders must be delivered to the undersigned in the envelope which will be provided, by Saturday, December 30, 1950.

The Board does not bind itself to accept the lowest or any tender.

FRANCIS C. BRIGGS,
Divisional Manager.

No. 2. Division,
West Midlands Gas Board.
Gas Offices,
Kensington House,
Bath Street,
Dudley,
Worcs.

APPOINTMENTS VACANT

NORTH EASTERN GAS BOARD

BRADFORD GROUP.
ADMINISTRATIVE ASSISTANT.

APPLICATIONS are invited for an ADMINISTRATIVE ASSISTANT in the Group Office at Bradford, at a salary within Grade VIII (£490-£570 per annum) of the Salary Scales of the National Joint Council for Gas Staffs.

Candidates should be competent to deal with administrative and establishment matters.

The appointment will be subject (i) to such superannuation scheme as the Board may adopt, and (ii) to the successful applicant passing a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be sent to the Group General Manager, North Eastern Gas Board, Bradford Group, Britannia House, Bradford, so as to arrive not later than Monday, December 18, 1950.

J. C. GARDNER,
Secretary.

Bridge Street,
Leeds, 2.
November 28, 1950.
BG.

NORTH WESTERN GAS BOARD

MID-CHESHIRE GROUP.
NORTHWICH DISTRICT.
DISTRICT SERVICE MANAGER.

APPLICATIONS are invited from suitably qualified and experienced persons for the above position.

The successful applicant will be responsible for all branches of consumer service including the control of the gas fitting and maintenance staff and the supervision of showrooms.

The commencing salary will be within the range of £490-£570 per annum, according to experience and qualifications.

The successful applicant may be required to pass a medical examination, and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, appropriately endorsed and giving personal details, particulars of training, qualifications and experience, together with the names and addresses of two referees, should reach the undersigned not later than 12 days after the publication of this advertisement.

J. H. RICHMOND,
General Manager.

57, High Street,
Runcorn.

NORTH WESTERN GAS BOARD

MID-CHESHIRE GROUP.
RUNCORN WORKS.
STATION ENGINEER.

APPLICATIONS are invited for the position of STATION ENGINEER at the Runcorn Gasworks at a salary within the range of £570-£670 per annum, including the value of the occupation of a house.

Candidates should possess the Higher Grade Certificate of the Institution of Gas Engineers, and preferably should have had experience in the control of horizontal retorts.

The successful candidate may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Detailed applications, together with the names and addresses of two referees, should reach the undersigned within 14 days of the publication of this advertisement.

J. H. RICHMOND,
General Manager.

57, High Street,
Runcorn.

NORTH WESTERN GAS BOARD

MID-CHESHIRE GROUP.
COKE SALES REPRESENTATIVE.

APPLICATIONS are invited from suitably experienced persons for the position of GROUP COKE SALES REPRESENTATIVE who will be responsible for the development and co-ordination of coke sales within the Mid-Cheshire Group.

The salary will be within the range of £520-£620 per annum according to qualifications.

Applicants should have a wide experience in the sale of solid fuels for industrial and domestic purposes and should have a knowledge of the control and operation of transport.

The successful candidate may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Detailed applications, together with the names and addresses of two referees, should reach the undersigned within 14 days of the publication of this advertisement.

J. H. RICHMOND,
General Manager.

57, High Street,
Runcorn.

NORTH WESTERN GAS BOARD

MID-CHESHIRE GROUP.
NORTHWICH WORKS.
CHEMIST.

APPLICATIONS are invited from suitably qualified persons for the above position. Candidates should be experienced in the carrying out of routine laboratory tests.

Experience in gasworks laboratory, benzole recovery plant, and horizontal retorts will be an advantage.

The salary will be within the scale £450-£530 per annum, according to experience and ability.

The successful applicant may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt.

Applications, stating age, giving full particulars of education, training, qualifications and experience, together with the names of two referees, should be received by the undersigned not later than 12 days after the publication of this advertisement.

J. H. RICHMOND,
General Manager.

57, High Street,
Runcorn.

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE CO., LTD.

24, FENNEL STREET, MANCHESTER, 4.

GASHOLDER SURVEYORS.

THE Company has vancacies for SURVEYORS. Permanent position, progressive salary scale with non-contributory pension.

Candidates, age 26 to 34 years, who have served an apprenticeship with a reputable firm of gasholder manufacturers are invited to apply, stating age and qualifications. Experience on outside erection of gasholders essential. Knowledge of both riveted and welded construction an advantage.

WEST MIDLANDS GAS BOARD

WARWICKSHIRE DIVISION.
COVENTRY DISTRICT.
PRODUCTION ENGINEER.

APPLICATIONS are invited from suitably qualified persons for the above position at Foleshill Gasworks.

Candidates should possess the Institution of Gas Engineers Higher Grade Certificate in Gas Engineering (Manufacture), should have had considerable experience in gas production and be capable of controlling large carbonising and C.W.G. installations. Candidates should also be able to control retort house and general yard labour. The person appointed will be directly responsible to the Deputy Gas Engineer.

The commencing salary will be within the range of £645-£770 per annum, in accordance with Grade XII of the Salary Scales of the National Joint Council for Gas Staffs.

The appointment will be subject to such superannuation regulations as the Board may, in due course, adopt and the successful candidate may be required to pass a medical examination. A four-roomed flat at a reasonable rent is available if required.

Applications, giving details of age, qualifications and experience, together with the names of two referees, should be addressed to Mr. A. Allen, Divisional Manager, West Midlands Gas Board, Warwickshire Division, Gas Street, Coventry, to reach him not later than 14 days after the appearance of this advertisement. Applicants are requested to quote reference T.P.3 when replying to this advertisement.

F. H. CURETON,
Secretary.

(Classified advertisements continued on Supplement 6)

APPOINTMENTS VACANT (ctd.)

WEST MIDLANDS GAS BOARD

WELLINGTON DISTRICT.

ASSISTANT SALESMAN.

APPLICATIONS are invited for the above appointment from persons with experience in window display, sales promotion of gas and coke burning appliances and the interviewing of consumers.

Salary will be within Grade III, A.P.T. (£250 to £400 per annum) according to age and qualifications. A modern flat is available at a moderate rental if required.

The successful applicant, who will be responsible to the Senior Salesman, will also be required to pass a medical examination and the appointment will be subject to any superannuation scheme which the Board may introduce.

Applications, stating age, qualifications and experience, accompanied by the names of two referees should be addressed to Mr. C. M. D. Belton, Divisional Manager, Shropshire Division, Sidney House, School Court, Shrewsbury, within 14 days of the appearance of this advertisement.

F. H. CURETON,
Secretary.

NORTHERN GAS BOARD

SUNDERLAND DIVISION.

COSTING ASSISTANT.

APPLICATIONS are invited from suitably qualified persons for the above appointment at the Divisional office, Sunderland.

Applicants should have detailed experience in the preparation of cost accounts, including the use of mechanised methods and should be capable of controlling costing on a divisional basis.

An appropriate qualification will be deemed an advantage.

Salary Grade A.P.T. VII, scale £450-£530, and conditions in accordance with the National Joint Council for Gas Staffs.

The successful candidate will be required to pass a medical examination and the appointment will be subject to the provisions of such superannuation scheme as may be adopted by the Board.

Applications, stating age, experience and qualifications, giving names of two referees, should be addressed to the Divisional General Manager, Northern Gas Board, Sunderland Division, Fawcett Street, Sunderland, within 14 days of the issue of this advertisement and endorsed 'Costing Assistant.'

NORTHERN GAS BOARD

DARLINGTON DIVISION.

DARLINGTON UNIT.

RENTALS SUPERINTENDENT.

APPLICATIONS are invited for the appointment of a RENTALS SUPERINTENDENT for the Darlington Unit.

Salary will be in accordance with the N.J.C. Scales for Gas Staffs, Provincial 'A,' Grade 'D,' maximum £500 per annum, placing according to qualifications and experience.

Applicants must have had good experience in all aspects relating to the rentals department of a large gas undertaking, including mechanised billing, prepayment records, accounting records, and control of staff and collectors. The successful candidate will be required to pass a medical examination and to subscribe to such superannuation scheme as may be adopted by the Board.

Applications, endorsed 'Rentals Superintendent,' stating age, experience and qualifications, and giving the names of two referees, should be addressed to Charles Hindle, Esq., Engineer and Manager, Darlington Unit, Northern Gas Board, John Street, Darlington, not later than December 11, 1950.

F. WILSON,
Divisional General Manager.

November 20, 1950.

NORTHERN GAS BOARD

SUNDERLAND DIVISION.

APPLICATIONS are invited from suitably qualified persons for the following appointments:

DEPUTY ENGINEER, SUNDERLAND UNIT.

Applicants should have a first class engineering background and possess wide experience in the construction, operation and maintenance of modern gas manufacturing plant.

The possession of the Diploma in Gas Engineering (Manufacture) of the Institution of Gas Engineers, or its equivalent, will be an advantage.

Commencing salary £850 per annum.

CHIEF CHEMIST.

Applicants for this appointment, which carries divisional status, must have secured by examination either a degree in pure science or Associate Membership of the Royal Institute of Chemistry and be gasworks trained.

Salary Grade A.P.T. VIII, scale £490-£570, and conditions in accordance with the Agreement of the National Joint Council for Gas Staffs.

DRAUGHTSMAN.

Applicants should be experienced in the design and layout in gasworks construction, erection of plant and buildings, &c., and preferably trained in the drawing office of a gas plant contractor.

Salary Grade A.P.T. VI, scale £415-£495, and conditions in accordance with the Agreement of the National Joint Council for Gas Staffs.

The successful candidates will be required to pass a medical examination and the appointments will be subject to the provisions of such superannuation scheme as may be adopted by the Board.

Applications, stating age, experience and qualifications, giving names of two referees, should be addressed to the undersigned within 14 days of the issue of this advertisement and suitably endorsed.

W. O. KIRKWOOD,
Divisional General Manager.

Fawcett Street,
Sunderland.

November 25, 1950.

DRAUGHTSMEN

GAS PLANT.

IMPORTANT Midland Company require a number of first class DESIGN and/or DETAILING DRAUGHTSMEN for all classes of Gas Holders and Gas Plant, etc., positions offer exceptional experience.

Canteen and excellent working conditions available.

Particulars and salary required to Personnel Manager, Horseley Bridge and Thomas Piggott, Ltd., Tipton, Staffs.

EASTERN GAS BOARD

CAMBRIDGE DIVISION

PETERBOROUGH GROUP.

ASSISTANT TO GROUP ACCOUNTANT.

A SUITABLY qualified ACCOUNTANT, 30 to 40 years of age, is required to assist the Group Accountant in the control of the financial and costing activities of six gas undertakings attached to the Peterborough Group.

Applicants should hold, or have held, one or more executive accounting appointments and should be conversant with modern financial and cost accounting methods and records.

Experience in the gas industry is desirable.

The salary will be in accordance with Grade IX of the National Joint Council for Gas Staffs Salary Scales and the commencing salary within this grade is dependent on the experience of the person appointed.

Applications, stating age, and giving full particulars of qualifications and experience, together with the names of two referees, should be sent to the Divisional General Manager, Eastern Gas Board (Cambridge Division), 52, Sidney Street, Cambridge, within 14 days of the publication of this advertisement.

SOUTH EASTERN GAS BOARD

EASY SURREY DIVISION.

CHEMIST AND TECHNICAL ASSISTANT

HORLEY WORKS.

APPLICATIONS are invited for the above-mentioned position.

Applicants should have had experience in the control of manufacturing plant and the necessary chemical training and experience to enable them to carry out the usual routine gas tests.

The salary will be within the range of £370-£480 per annum according to qualifications and experience.

Applications (quoting reference V10/111), giving details of service in the gas industry, age, present occupation, experience and qualifications, &c., should reach the undersigned not later than December 23, 1950.

R. J. MCCRAE,
Personnel Manager.

Katharine Street,
Croydon.

THE "FLUXITE QUINS" AT WORK

"I've plumbed some rum jobs in my day.
Pipes of all shapes" gurgled EH.
"But by yon bonnie banks,
And to FLUXITE, our thanks.
We will render the banks - and the braes".

For all SOLDERING work—you need FLUXITE—the paste flux—with which even dirty metals are soldered and "tinned." It does not "poison" the solder nor corrode the metal—and can be used with safety even on sensitive apparatus.

With Fluxite, joints can be "wiped" successfully that are *Impossible by any other method.*

FLUXITE has been used for over 40 years in Government Works and by the leading Engineers and Manufacturers. OF ALL IRONMONGERS—in tins—10d. 1s. 6d., and 3s. 0d.

The FLUXITE GUN puts FLUXITE where you want it by a simple pressure. Price 2s. 6d. or filled 3s. 6d.

ALL MECHANICS WILL HAVE

FLUXITE

IT SIMPLIFIES *ALL* SOLDERING

Write for Leaflets on CASE HARDENING STEEL and TEMPERING TOOLS with FLUXITE also on "WIPED JOINTS." Price 1d. each.

Fluxite Ltd. (Dept. G.J.), Bermondsey Street, S.E.1

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IRON & STEEL
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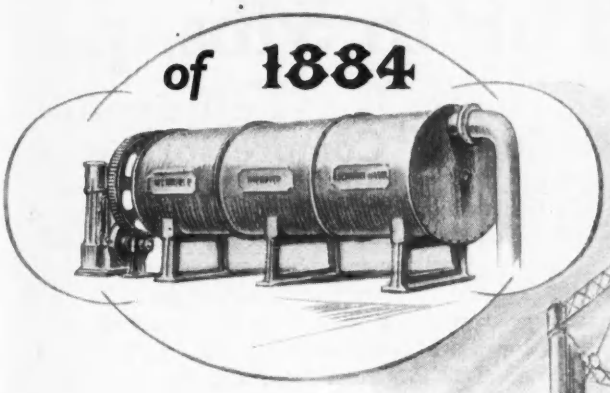
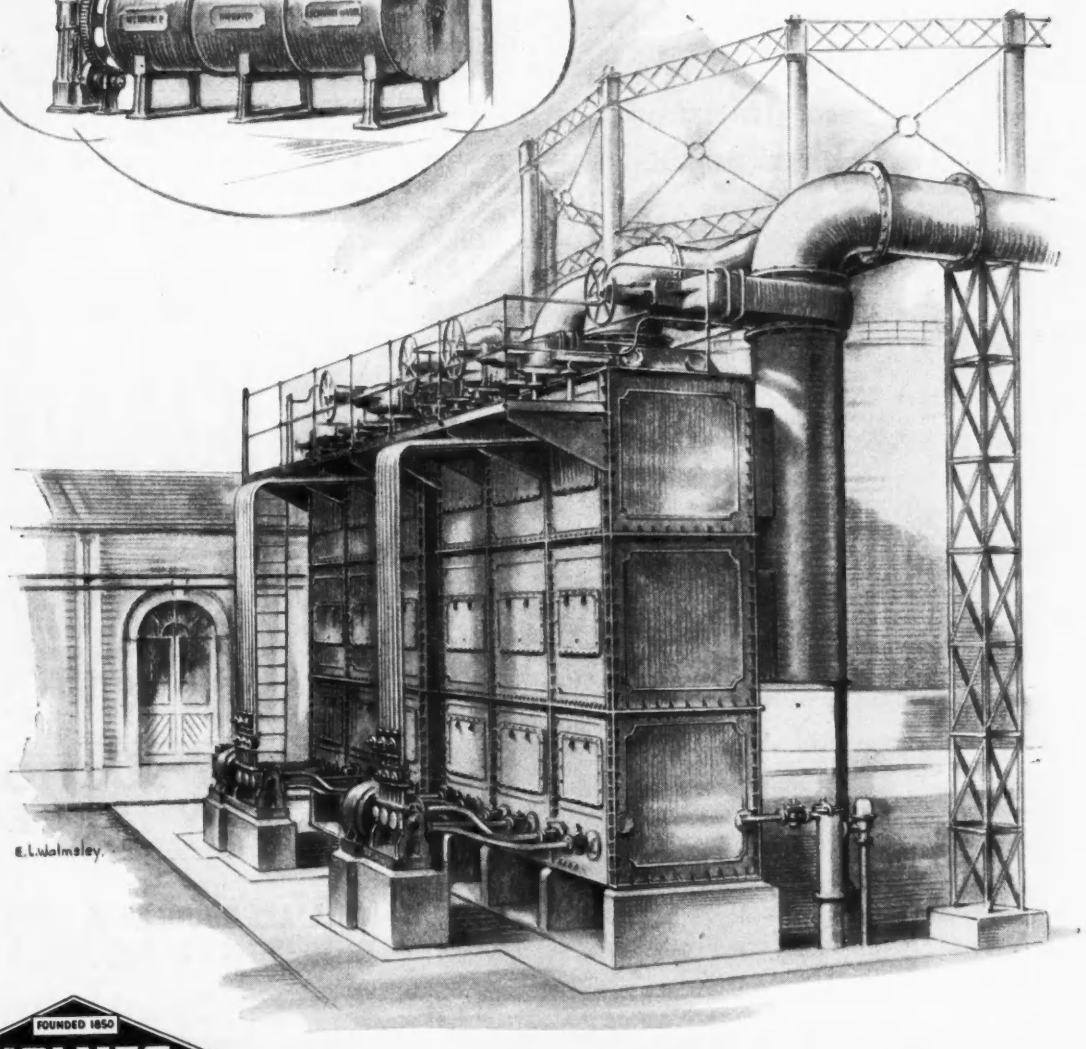
of 1884





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HOLMES
HUDDERSFIELD

MULTIFILM *Static* WASHER *of 1950*

HOLMES CENTENARY YEAR

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C354

When pressure of Gas or Air has to be increased up to 5 lbs. p.s.i.

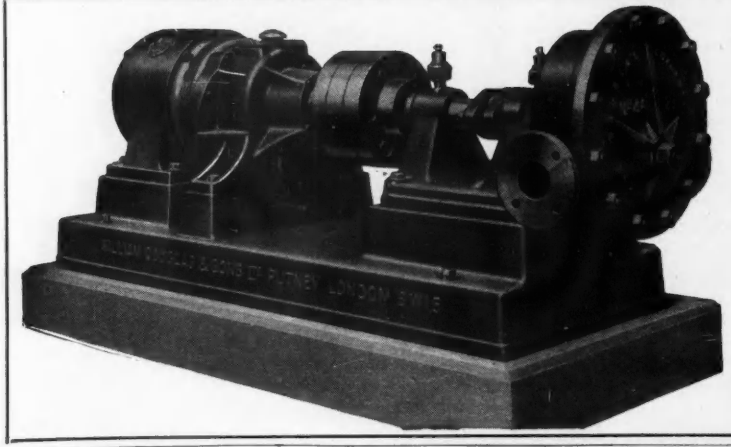
you can do it more economically and efficiently with these "Keith-Blackman" Compressors....

THE machine illustrated in this advertisement is our Type 4, fitted with fast and loose belt pulleys and striking gear. This type is especially suitable for compressing air or gas for industrial purposes, such as furnace heating, metal melting, brazing, soldering, etc. . . This type is made in several sizes, and there are many other types, in various sizes and for all drives, for dealing with volumes up to 20,000 cubic feet per hour.

Ask for a copy of our Cat. G 57.

"KEITH-BLACKMAN"
ROTARY COMPRESSORS

KEITH BLACKMAN LTD., MILL MEAD RD., LONDON, N.17. TN: TOTTENHAM 4522. TA: "KEITHBLAC NORPHONE LONDON."
And at Manchester Birmingham Leeds Newcastle-on-Tyne Glasgow Belfast and Penarth nr. Cardiff.



"THE DOUGLAS PUMP"
STEAM HEATED FOR TARS.

GOOD SUCTION
SLOW SPEED

WILLIAM DOUGLAS & SONS LTD.,
PUTNEY - - LONDON, S.W.15.

WESTWOOD & WRIGHTS
LIMITED

BRIERLEY HILL,
STAFFS.

GASHOLDERS · PURIFIERS · WASHERS ·
CONDENSERS · CASTINGS · STEELWORK ·
GAS VALVES · WELDED PIPES

Printed by STRAKER BROTHERS LTD., E.C.2, for WALTER KING, LIMITED, 11, EOLT COURT, FLEET STREET, LONDON, E.C.4. Wednesday December 6, 1950.

THE MODERN RETORT HOUSE

"Recent designs have shown the emergence of a distinctive style, similar to that which has been adopted in many other industrial buildings of like architectural proportions and which has been called, with some felicity, the 'industrial perpendicular'"

Editorial in the "GAS JOURNAL" of July 28, 1948, p. 205

WEST'S GAS

IMPROVEMENT COMPANY LIMITED

ALBION IRONWORKS · MILES PLATTING · MANCHESTER

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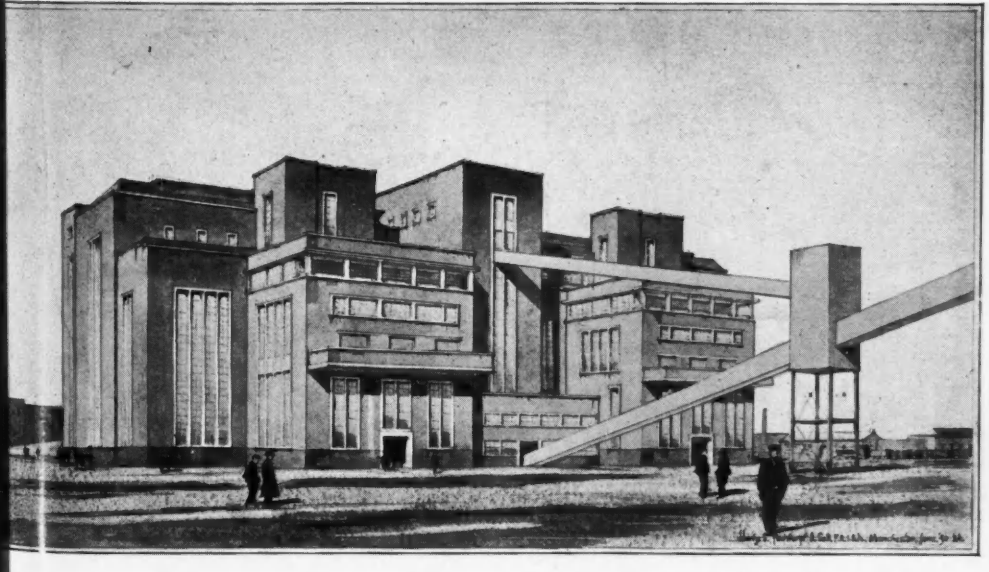
SYDNEY OFFICE:
Union House, 243 George Street

NEW YORK OFFICE:
99, Broad St., New York, 4

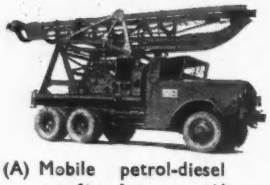


BRISTOL—STAPLETON ROAD GASWORKS.

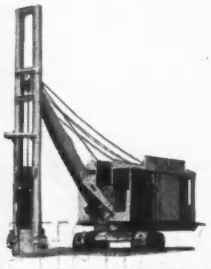
WEST'S-PILING

PROVIDES SECURE FOUNDATIONS FOR ANY STRUCTURE

PLANT FOR DRIVING OUR SPECIALISED SYSTEM OF PILING

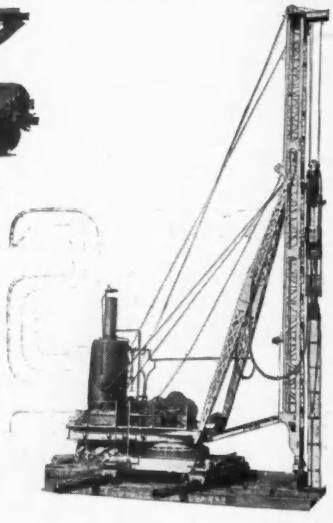


(A) Mobile petrol-diesel outfit for small contracts.
2-ton Drop Hammer.



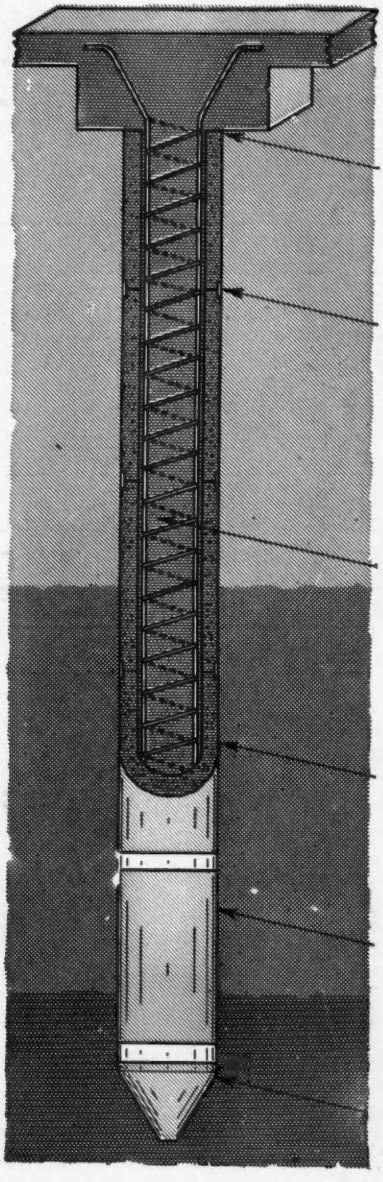
(B) Medium mobile diesel outfit for undulating sites.
3-ton Drop Hammer.

(C) Large mobile diesel outfit for undulating sites.
3-ton Drop Hammer.



(D) Typical steam frame for extensive sites.
4-ton Steam Hammer.

(E) Large mobile diesel outfit for undulating sites.
3-4 ton Drop Hammer.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TOP PILE SHELL ONLY CUT TO SUIT PILECAP
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CONCRETE CORE AND STEEL REINFORCEMENT NOT FATIGUED AS IT IS PLACED AFTER SET IS OBTAINED
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SOLID CONCRETE SHOE TAKES DRIVING STRESS AND PENETRATES INTO LOAD BEARING STRATA

NO WASTAGE — NO COSTLY EXTENSIONS
PILE SHELL DRIVEN IN STANDARD SECTIONS TO DESIRED RESISTANCE

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Northern Office: Albion Ironworks, Manchester 10. Telephone: Collyhurst 3049. *Scottish Office:* 103, West Regent Street, Glasgow, C.2. Telephone: Douglas 25[illegible]6